CALIFORNIA INFRASTRUCTURE - MODELS FOR DELIVERY

Anderson Management Research Team #14
Kavika Dilawari, David Leipziger, Anjana Rimal, Joel Ulloa

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EXECUTIVE SUMMARY

Problem

California is one of the busiest, largest, and, consequently, highest resource-demanding states in the country. With a population of approximately 37 million and an economy that ranks sixth in the world, there is no doubt that California relies heavily on its existing infrastructure. Therefore, it is imperative that the state's infrastructure capacity keep pace with its growing population and economic activity to remain competitive and a desirable place to live.

Despite how commonly accepted it is that a robust economy necessitates a robust infrastructure system, California, like most other states, cannot keep up with its growing tab of infrastructure improvement needs. Shortfalls in public funds and costly delivery of infrastructure plague California with financial constraints and a deteriorating infrastructure. Challenged with political partisanship, mounting environmental concerns, increasing population projections, declining federal funds, and rising budget deficits, California and other governments are deferring maintenance and upgrades to its infrastructure.

If traditional means to addressing infrastructure needs are growing more constrained, it is necessary to think creatively about alternative tools that can help. Traditional financing and public funds may be able to leverage support and capital from the private sector to help relieve California's infrastructure capacity concerns.

Project Purpose

This report offers a comprehensive business analysis for the UCLA Institute for Transportation Studies (ITS), that evaluates alternative project delivery and financing models that could be applied to California. Specifically, the report investigates tools such as Public-Private Partnerships (P3) and other alternatives to traditional project delivery that more aggressively engage the private sector. The primary objective of this report is to answer the following question:

> What lessons can we learn from existing models of alternative delivery and financing that can be applied to California to successfully garner support of private sector participation through P3s and other tools?

This report evaluates California's current challenges with funding and financing infrastructure improvements, and draws upon innovative project delivery examples, domestic and abroad, that could help address these funding shortfalls.

Findings

Given the complexity of the industry, it was necessary to draw on first-hand experience from industry leaders in both the public and private sector and in a variety of roles involved in the infrastructure development process. Assessing historical data on procurement procedures- number of projects completed, and notable case studies- was also a key component of determining viable solutions. The following are the major findings as they pertain to current project delivery, existing financing and delivery models, and applicability to California.

1. Private participation can significantly improve effectiveness of project delivery.
2. Private participation can be engaged through P3 procurement, 63-20 IRS Rule execution, and enhanced land value capture.
3. P3 procurement and general private engagement is impeded by concerns over public sector jobs, the unfavorable perception of public asset privatization, and a significant misunderstanding of the benefits of P3 procurement.
4. Strategies to overcome these obstacles include political advocacy, standardizing a process statewide, soliciting high quality expertise, bundling projects to attract investors, and involving technology.
5. These strategies can be applied to California by presenting statewide solutions rather than at a national scale, understanding the capital capacity and infrastructure needs of jurisdictions varying in size and political influence, and drawing expertise from successful models domestically and abroad.

Recommendations

Based on these findings and subsequent analysis of leading research, industry benchmarks, and empirical data, we propose the following recommendations:

1. Engage the private sector through three types of measurable pilot projects that can present successful case studies for future implementation: 63-20 IRS Rule provisions, bundling of smaller scale projects to attract investors, and employing technology for first mile-last mile innovation and data collection that can improve infrastructure operations.
2. Establish a board of advisors that draws on the experience of leaders in the industry both in the public and private sectors. These advisors can provide policy recommendations and procedural solutions for enhancing partnerships between the public and private sectors.
3. Establish an independent central agency to legitimize private participation procedures and provide recommended procedures that can standardize the process and in turn stabilize the industry to attract private investment.

In implementing these recommendations, there will be a need to mitigate risks, as shown in the table below. If ITS can successfully guide California to move forward with these strategies, it could transform mobility in the state. California could become a leader in transportation infrastructure delivery while promoting economic development and maintaining fiscal stability.

Recommendation	Short-Term (6 mos.-1 yr)	Mid-Term (10 mos.- 1 yr)	Long-Term (>1 year)
#1: Pilot Projects a. 63-20 b. Project Bundling c. Technology	**Action**: Consider possible projects in the pipeline. **Risk:** Non-applicability to all project types. **Contingency:** Thorough vetting analysis. **Success Metrics:** Cost-benefit and Value for Money analysis.	**Action**: Forge project partnerships. **Risk:** Lack of partnership incentive. **Contingency:** Customized evidence of partnership value. **Success Metrics:** Stakeholder and benefit analysis.	**Action**: Execute and document project. **Risk:** General project risks (eg. cost overrun). **Contingency:** Consult a board of advisors to plan project delivery. **Success Metrics:** Project execution data (eg. opportunity cost).
#2: Statewide Board of Advisors	**Action**: Create services and operations plan. **Risk:** Soliciting the right expertise. **Contingency:** Require referrals or create an RFP. **Success Metrics:** Benchmarking against stakeholder map.	**Action**: Create board and start advising. **Risk:** Sow on-boarding of local governments. **Contingency:** Promote board model benefits. **Success Metrics:** Local governments signed up for advice.	**Action**: Phase board into Central Agency (Rec#3). **Risk:** Political reluctance. **Contingency:** Provide applicable incentives. **Success Metrics:** Central Agency positions filled by board members.
#3: Central Agency	**Action:** Determine agency role and location (e.g., with CA iBank). **Risk:** Poor buy-in from entity stakeholders. **Contingency:** Make stakeholders more involved in discussions. **Success Metrics:** Formal role description and documentation.	**Action:** Establish scope and tasks based on industry benchmarks. **Risk:** Possible legislative hurdles. **Contingency:** Include policymakers in the discussion. Advocate for standardization. **Success Metrics:** Scoping document.	**Action:** Publish standardized processes and practices. **Risk:** Obsolescence of material and approach. **Contingency:** Update documentation often (e.g. every six months). **Success Metrics:** Successfully delivered projects.

I. INTRODUCTION

Quality infrastructure networks are imperative to a state's economic health and sustained levels of productivity. Well maintained and interconnected transportation networks efficiently move consumer goods to market; electrical grids power factories and offices that grow GDP and employment; and water systems ensure drinking water flows into homes of all citizens. Despite the economy's heavy reliance on a robust infrastructure system, California, like many states across the country, has approached infrastructure investment decisions with fiscal austerity over the past several decades. Faced with political partisanship, mounting environmental challenges, increased project complexity, declining federal funds, and rising budget deficits, governments are deferring maintenance and under-investing in infrastructure. This is consequently resulting in the rapid deterioration and erosion of infrastructure networks statewide.

In California, jurisdictions across the state struggle to expand necessary capacity of infrastructure facilities through traditional financing and delivery methods. Meanwhile, urban centers around the world have identified and deployed more effective means of alternative project financing and delivery that California might be able to learn from. This report seeks to offer a comprehensive business analysis on the state of infrastructure development in California, with a specific focus on the transportation sector. The primary goal of this report is to provide recommendations and strategies to the UCLA Institute of Transportation Studies (ITS) that can address the widening funding gap impeding California from meeting its critical and urgent infrastructure needs. The report evaluates traditional funding and financing mechanisms, alternative financing opportunities like Public-Private-Partnerships (P3), and draws from the first-hand experience of leaders in the industry. The recommended strategies are focused on assisting state, municipal, and local actors with P3 structures for infrastructure project delivery in a way that is optimal and equitable for all Californians, and the private and public stakeholders involved in infrastructure project delivery.

A. Client Introduction: The UCLA Institute of Transportation Studies

The UCLA Institute for Transportation Studies (ITS) is a leading research center that investigates plausible solutions for California's urban and regional challenges with emphasis on transportation, economic development and housing, and the environment. ITS was established in 1988 as a research center within the UCLA Luskin School of Public Affairs. The Institute is dedicated to the interdisciplinary study and understanding of urban and regional policy issues affecting California. The client (ITS) seeks to engage the Anderson AMR Team 14 to research, assess

and recommend ways in which transportation infrastructure in California can benefit from alternative financing and project delivery.

B. Scope and Objectives

As California continues to fall short on funds necessary for infrastructure upkeep and enhancement, it is imperative to think creatively about addressing this shortfall. Traditional financing mechanisms and established public funds may be able to leverage support and capital from the private sector to help relieve California's infrastructure capacity concerns. To identify alternative methods for infrastructure project financing and delivery, this report seeks to assess alternative models currently in existence, both domestically and abroad, and identify relevant features and characteristics that could be applied to California. While exploring models such as Public-Private-Partnerships (P3), it will be necessary to draw on the priorities and experiences of partners from public agencies, financial institutions, industry leaders, and relevant policy advocates. The primary objective of this report will be to answer the following question:

> What lessons can we learn from existing models of alternative infrastructure financing and how can these lessons be applied in the state of California to successfully expedite growth of the P3 infrastructure financing market?

The scope of Team 14's AMR project was to research California's challenges for funding and financing infrastructure improvements and draw on innovative project delivery examples, domestically and abroad, that could help address these funding shortfalls. Specifically, the team investigated tools such as Public-Private Partnerships (P3) and other alternatives to traditional project delivery that more aggressively engage the private sector. Criteria that guided our recommendations included: identifying optimal solutions for all parties involved, standardizing state-wide processes, and investigating the best strategies to educate public sector organizations on the benefits of private engagement for infrastructure financing.

II. Industry Context: California Infrastructure Financing & Delivery

A. Infrastructure Landscape

With nearly 40 million residents, California ranks as the nation's most populous state -- at its current population size, one of every eight Americans is a California resident. Census data indicates California's current populous is

nearly one and a half times that of Texas, the second most populated state in the country (28 million), and its headcount eclipses third place Florida, whose population of 19 million is less than half of California's. Since the 1980s, the state's population has increased by more than 50%, and over the next 30 years demographic forecasts predict that number will surpass 50 million - the equivalent of doubling the current population of Los Angeles. In addition to its first place ranking in population size, California is also the most economically productive state in the nation. If it were a country, California's economy would be the 6th largest in the world. In 2015, recorded gross domestic product (GDP) was $2.46 trillion and employment grew by 3% in and by 2% in 2015 and 2016 respectively. Home to large industrial clusters state-wide, such as technology in northern California, Hollywood film and manufacturing in Los Angeles, agriculture in the Central Valley, and a growing biotech industry in San Diego, maintaining California's economic health and productivity is imperative not only for its own residents, but to the United States financial health.

California's robust economy and growing population base was built on a foundation of strong infrastructure networks, which is the benchmark for economic health and sustained productivity: well maintained and interconnected transportation networks efficiently move consumer goods to market at a lower cost both domestically and in international markets, electrical grids and energy assets power factories and offices that grow the state's GDP and well-maintained water systems ensure healthy drinking water flows into American homes and decreases healthcare burdens for the state. Given California sizeable population and geographic reach, well-maintained infrastructure is critical. Transportation authorities estimate 342 million vehicles drove more than 324 billion miles on California roadways in 2014, while in that same year more than $1.38 trillion of goods were transported on those same roadways. Public transportation infrastructure assets also experience high utilization levels across the state;1 billion transit trips were recorded in the same year and the state ranks 3rd for port activity, with 230.2 million short tons recorded in 2012.

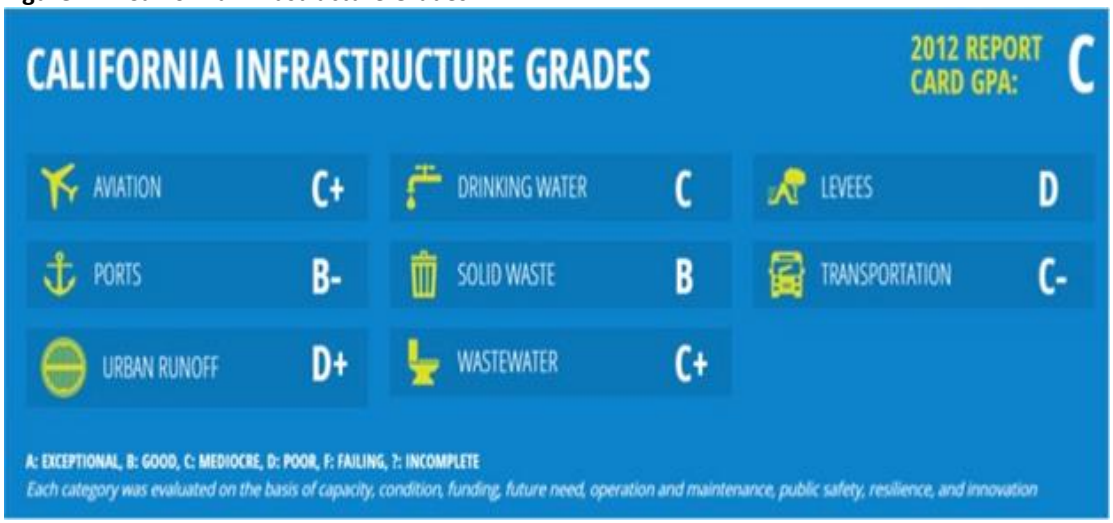
Quality infrastructure networks are imperative to sustained growth and ensuring economic health and productivity across the region. Given forecasts of continuous population growth, investing into infrastructure projects throughout California will be critical to sustain the state's current levels of productivity and maintain economic prowess in the future.

i. California State of Disrepair

Despite the pivotal importance infrastructure maintenance and investment is known to have on economic productivity, California- like many other states across the country faced with fiscal downturn and limited

resources- has approached investments into core infrastructure assets with financial austerity over the last several decades. Years of deferred maintenance and underinvestment have caught up, however: in 2012, the Army Corps of Engineers evaluated California's infrastructure and gave it an overall grade of C, indicating a "mediocre" quality level. As seen in Figure 2.1, its lowest performing infrastructure categories included its ports, urban runoff drainage systems, levees, and transportation systems. In the report, the Army Corp of Engineers determined that 68% of California's roads are in poor or mediocre condition while 5.5% of bridges are structurally deficient. Additionally, 68% of the State's dams have an emergency action plan, while 678 dams are considered highly hazardous.

Figure 2.1: California Infrastructure Grades



Source: American Society of Engineers

In general, California's infrastructure assets across all sub-sectors have seen minimal investment in recent decades: water infrastructure across the state has not been expanded since the 1970's and was originally designed to accommodate 20 million residents, yet it now supports a population exceeding 35 million. As experiences of poorly maintained water distribution networks in Michigan have recently illustrated, the consequences of continued overutilization without new investments into upgrades and maintenance could have dire results for Californians across the state.

With significant declines in federal investment and volatile fluctuations in state revenues, California's approach to infrastructure investment over the last several decades has largely focused on resource conservation and minimal financial wherewithal. Local and state entities have consistently deferred maintenance and preventative improvements for core assets in the face of shrinking budgets and economic downturns. These policy choices have come at a price: maintenance and prolonged underinvestment has compounded over decades, resulting in a

severe statewide "infrastructure deficit". The impact of this deficit costs Californians daily more than they even realize. In Los Angeles alone, city residents spend over 81 hours per year stuck in traffic. The Road Information Program (TRIP) estimates that deficient infrastructure costs the average California motorist between $590 and $800 in out-of-pocket expenses per year – this figure is more than double the national average. Out-of-pocket expenses include: excessive automobile repairs, tune-ups, tire replacements, and accelerated depreciation to name a few; these costs are produced by driving on substandard roadways that are pervasive throughout the state. As shown in Figure 2.2. the total cost of driving on dilapidated transportation network for Californians drivers on an annualized basis is upwards of $17 billion. Not only is the out-of-pocket costs for the average Californian double the national average, but also underinvestment and deferred maintenance compounded over decades have resulted in excessively costly rehabilitation and repairs estimates - more than 10 to 12 times what projected routine maintenance efforts would have been. Given the primary revenue source for funding state and sub-state infrastructure improvements and repairs is generally from increasing tax rates, the current costs estimates in addition to the loss in economic productivity that citizens experience daily will only increase.

Figure 2.2
Annual Cost per Driver on Inadequate Transportation Network

Location	VOC*	Congestion	Safety	Total
Los Angeles	$955	$1,300	$203	$2,458
Sacramento	$592	$699	$282	$1,543
San Diego	$876	$774	$236	$1,886
San Francisco-Oakland	$795	$1,266	$145	$2,206
San Jose	$760	$800	$163	$1,723
California – Statewide Total	**$17 Billion**	**$20.4 Billion**	**$6.6 Billion**	**$44 Billion**

Source: TRIP

B. Infrastructure: Funding & Financing

Options available for government entities at all levels for the funding and financing capital-intensive infrastructure projects are far from plentiful. Infrastructure projects and improvements often require billions in up-front capital outlays and additionally often require lengthy construction periods before revenues generated from the assets can cover maintenance and operations cost. In many cases, even once the project is complete, the costs of O&M (operation & maintenance) exceeds the capital generated from the asset. Over recent decades, increasingly strained budgetary resources and a lack of alternative mechanisms for funding, coupled with dwindling federal grant aid has left state legislatures with little choice but to defer maintenance and investment needed for critical

infrastructure projects in favor of higher priority agenda items. The compounding years of underinvestment into infrastructure maintenance have begun to erode performance quality of core infrastructure assets across all categories, as well as decrease the useful life expected of the asset. Deferred maintenance is no longer a viable option.

i. Funding

Funding for infrastructure, specifically transportation infrastructure comes from a variety of sources appropriated from the revenue streams generated at each level of government. Table 2.1 outlines the primary revenue sources allocated to funding transportation at each level.

Table 2.1: Federal, State and Local Funding & Financing Mechanisms in CA

	Federal	State	Local
Funding	× Fed. Gas Tax ($0.184/gallon) × General Fund	× State Gas Tax ($0.278/gallon) × User Fees × Sales Tax	× Sales Tax × Development Fees × Transit Fares × Property Taxes
Financing	× Private Activity Bonds × Build America Bonds	× General Obligation Bonds × Infrastructure Bank Debt	× Municipal Bonds

According to the Pew Charitable Trust, the federal government generates 25% of national transportation revenues, while the state generates 40%, and local governments generate 35%, as depicted in Figure 2.3. Figure 2.4 illustrates the flow of funding between levels of government that occurred in 2012.

Figure 2.3: % Total Expenditures by Federal, State & Local Governments on Highways and Transit

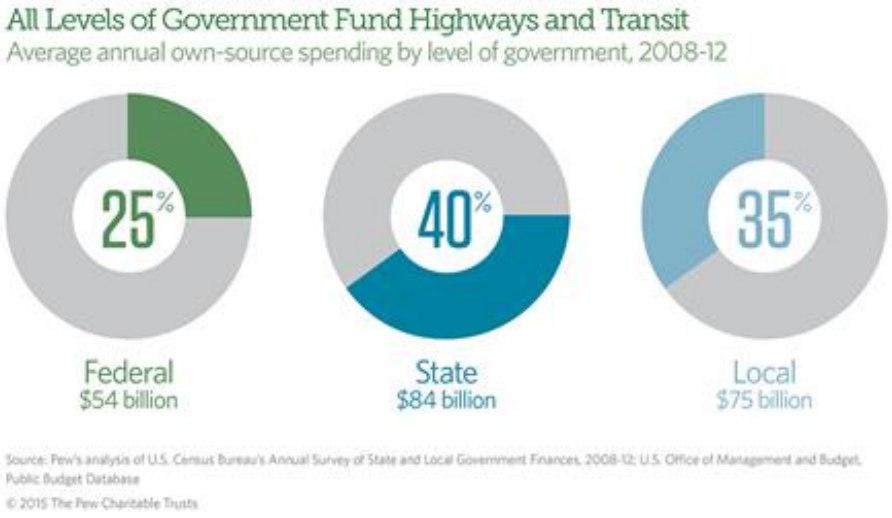
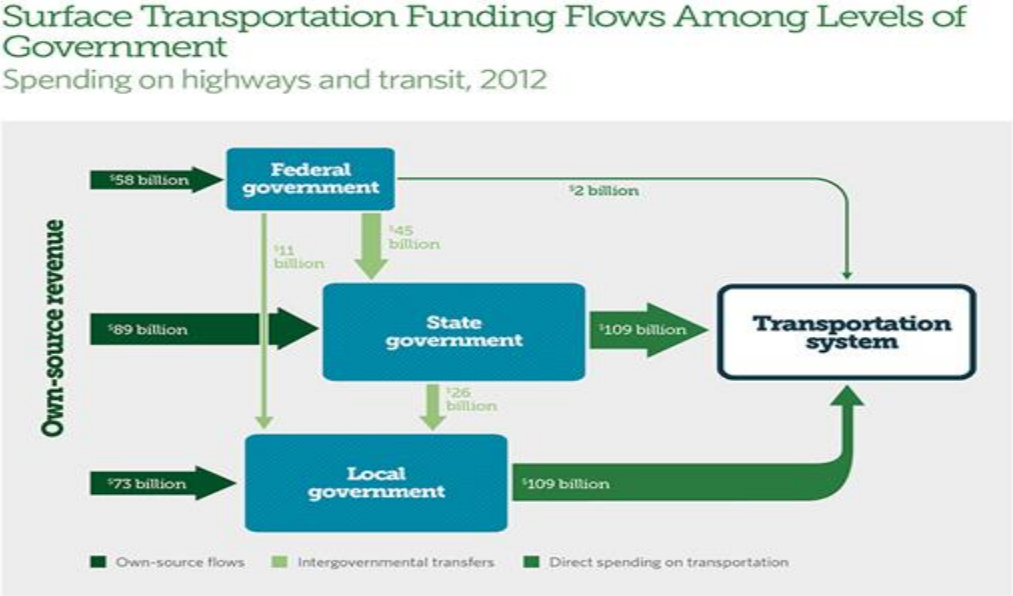


Figure 2.4: Surface Transporting Funding Flows Among Levels of Governance



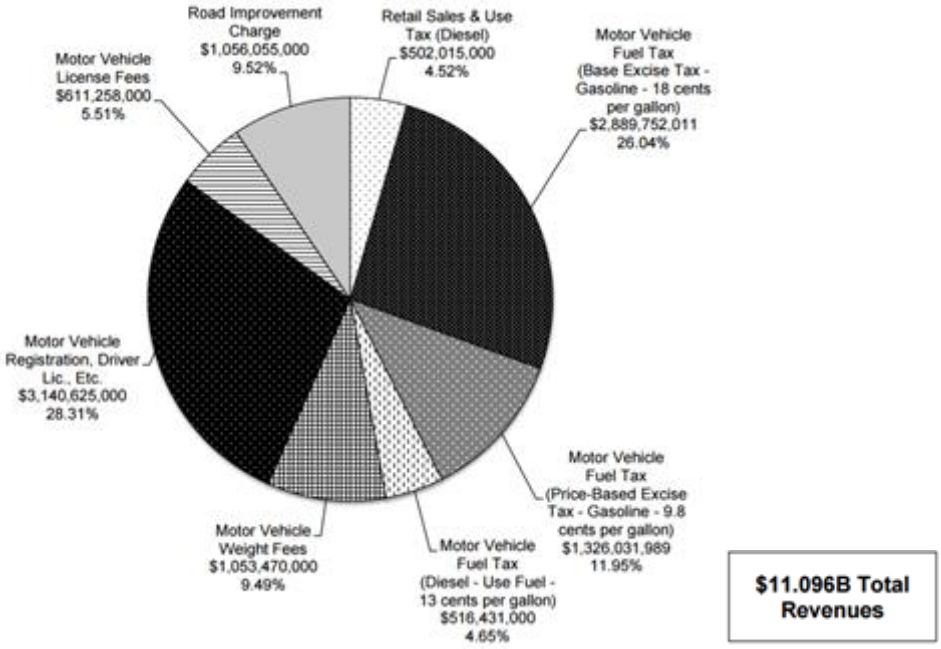
Source: Pew Charitable Trust

Federal Funding. Federal funds allocated for transportation infrastructure improvements and development are primarily generated through the nationally imposed gas tax; specifically, federal gas tax revenues fund the Federal Highway Trust Fund (FHTF). Other major sources of revenue used for transportation capital improvements include the general fund, of which an estimated 4% is appropriated for projects related to transportation infrastructure. Over time however, revenues generated from the federal gas tax have been waning as a percentage of total funding, forcing cash strapped municipalities and state governments to shoulder an increasing amount of the

burden for infrastructure improvements related to transportation networks in order to close the gap. This decrease in federal grant aid primarily stems from the fact that the national gas tax has not increased since last authorized by Congress in 1993 (Federally Imposed Gas Tax is 18.4 cents per gallon). The tax fee at present significantly lags behind a rise in inflation over that time period, and revenues continue to decline. In convergence, a rise in efforts that promote environmental conservation amongst the broader population- specifically, the rise of energy efficient vehicles- means overall volume of gas consumption by Americans has also declined, further eroding limited federal revenue streams previously allocated to transportation projects. Despite bipartisan consensus on the increasing criticality of finding sources to fund infrastructure investments, increasing the gas tax or pegging it to the rate of inflation has not garnered enough congressional support to authorize an increase. Needless to say, 18.4 cents per gallon has not been enough to meet even minimum levels of funding required for basic maintenance throughout the country and states and sub-state agents have not been able to close the gap. As a consequence of the widening deficit, Federal agencies have been forced to dip more deeply into the general fund in order to cover costs, which impacts bond credit ratings due to the corresponding increase in the federal debt service ratio. Figure 2.4 illustrates the growing gap between gas tax revenues and infrastructure funding needs ("outlays").

State Funding. States generate revenue from different sources to add to the pool of funds available for infrastructure improvement. Typically, states use a combination of an additional gas tax, sales tax and a variety of user fees including but not limited to: annual vehicle registrations, license renewals, and other user fees such as tolls and road scales for commercial vehicles, and often a sales tax for these purposes. California, specifically, enforces a gas tax of 27.8 cents per gallon, 9.4 cents above the 18.4 cents imposed by the federal government. As seen on Figure 2.5, California relies heavily on its gas tax for transportation spending, utilizing approximately 40% of its total revenues for these purposes. As consumers transition to more efficient vehicles, however – hybrid engines and electric cars – consumption of fuel will inevitably continue to decrease per user, rendering the gas tax as ineffective as the federal user fee for using the state's roads. California has rolled out pilot projects to test charging consumers per miles traveled, but is still in early stages of development.

Figure 2.5: California Revenue



Source: Caltrans, 2014

Municipal Funding. At the municipal level, local governments and public agencies use other sources to supplement funds for transportation projects. These can typically include public transit fares, advertising on buses, rolling stock, and various public facilities, development fees, property taxes, and sales taxes. In cities with high congestion, challenges and growing capacity concerns, local governments are relying less on state and federal funds and exploring other measures to close their funding gaps. In Los Angeles, county voters have taken it upon themselves to increase their sales taxes in order to fund local transportation needs. Since 2008, Los Angeles County has passed two separate measures (Measure R – 2008, and Measure M – 2016) that have increased the sales tax of its residents by a total of one cent to fund public transit and highways. Consequently, municipal revenues in Los Angeles generate almost 50% of its total sources. State funding constitutes 27%, while federal funds account for 24% of funds for transportation spending.

ii. Financing

In general, infrastructure in the United States is traditionally financed through a combination of agency equity (revenues or general fund money) and debt (bonds or other loans). State and local governments in California can issue debt in the form of bonds including Private Activity Bonds (PAB's), Build America Bonds (BAB's), and specific to California, General Obligation (GO) Bonds. Municipalities also have the option of utilizing municipal debt

issuances, which are tax-exempt debt instruments. Table 2.2 outlines each bond and its typical application. Bonds have increased significantly as a share of state capital spending. Since the 1990's, bond issuance has constituted more than half of total capital spending by California's government.

Table 2.2: Bonds and their Applications

Bond:	Full Title:	Government Issuer:	Description	Benefits:	Drawbacks:
PABs	Private Activity Bonds	State, Municipal	Bonds issued by state and local municipalities for capital directed at projects that primarily benefit private purpose but also serve some public purpose. PABs are issued for capital projects where more than 10% serve private purpose. $35 Billion worth of PABs were issued in 2015. Funds are allocated on a state-by-state basis.	Funds primarily allocated to: primarily to low-income housing and student loan programs, in addition to sewage and intercity rail projects	These bonds have many eligibility restrictions that dictate how public/private partners can work together to utilize funds.
BABs	Build America Bonds	Municipal	BABs function like tax exempt municipal bonds except: they are taxable-- instead investor incentive is either: 35% direct fed subsidy to borrower or tax credit worth 35% of interest owed to investor.	Raised $185 Billion of capital during short life span (very attractive to many investors) given these incentives.	BABs issuance has been undercut by congressional dysfunction -- cut by 7.3% due to sequester. This reduced payment amounts promised to investors, shaking investor confidence in Fed Gov't being able to meet debt obligation
QPIB*	Qualified Public Infrastructure Bonds	State, Municipal	Same as PABs, but would not be subject to state borrowing caps and would be exempt from the alternative minimum tax.	QPIBs are one way to give states and localities more options to work with the private sector without giving up the advantage of federally subsidized debt.	Cannot be used for social infrastructure (schools, courthouses, etc).Further, QPIBs have slim Republican suppor.
Tax-Exempt Munis	Tax Exempt Municipal Bonds	Municipal	Tax exempt municipal bonds are used to funds buildings, highways, roads, etc. No cap on amount a municipal government can issue - in 2014, $341B worth of private activity bonds were issued in CA (?).	From an investor stand-point, incentive to purchase muni bonds as they can deduct the interest earned on security (federal government forgoes $30B a year in interest-forgiveness associated with municipal bonds). Tax exempt organizations (e.g. public pension funds) are typically not interested in this type of investment since they do not recieve any tax benefits from purchasing.	Tax exempt muni bond funds can be used ONLY for public projects - they cannot fund projects that serve the private benefit or are in any partnership with private sector for project delivery.

General Obligation (GO) bonds are one of the most heavily used financing tools for infrastructure in California. According to the Legislative Analyst Office (LAO), the state spent $103 billion between 2000 and 2010. General obligation bonds and lease-revenue bonds accounted for almost two-thirds of the state's infrastructure spending during this period.

GO bonds allow the state to take out long-term loans (generally for a 20-40-year period) to finance its infrastructure needs. Cost of capital (e.g. borrowing) is considered equitable given that various generations that will benefit from an infrastructure project contribute to its financing. These bonds are, additionally, easy to pass, as they require only simple majority approval versus most local infrastructure spending measures, which must meet supermajority thresholds. In contrast, there are also a number of drawbacks to GO bond financing. For instance, interest payments on debt financing (bond issuance) can double the cost of a given infrastructure project. The most critical drawback, however, is that state GO bonds are not tied to new revenue sources, and thus increase obligations on the state's general fund. If the economy remains robust and state revenues

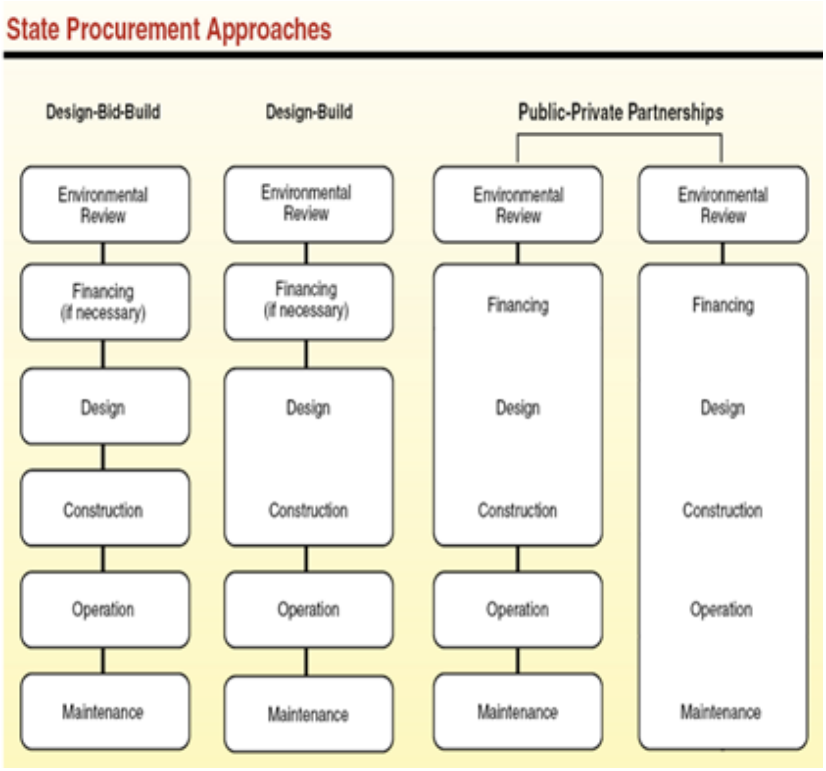
experience continued growth at a consistent pace, there is no concern; however, when the state's debt-servicing obligations make up a large proportion of total revenues, it can impact a State's credit rating and ability to issue bonds going forward. This can consequently require significant cuts to other necessary state spending programs.

Overall, state and municipal financing mechanisms for transportation in California are not nearly enough to address the deficit that exists for financing critical infrastructure projects across the state. The State's General Fund Budget is in deficit by $1.6 billion and California already maintains the highest personal tax rate in the nation at 13.3% of income. Additionally, recent attempts to raise vehicle registration fees and gas taxes were met with extreme opposition from the public –meaning state actors are left with limited realistic options for expanding and diversifying tax revenue streams necessary to fund the critical infrastructure projects vital to California's sustained economic prosperity.

C. Delivery Methods

Project delivery is the next phase in the infrastructure development process. Public sector participants use a variety of delivery structures to complete infrastructure projects procurement. Public agencies can procure a project per traditional means or, depending on the state, by pursuing a Public-Private-Partnership (P3) agreement. Traditional methods of delivery in the United States are projects procured under a method that either separates each phase of project development or combines the design and build component of delivery. These distinct delivery structures are known as Design-Bid-Build (DBB) or Design-Build (DB), respectively. Figure 2.6 compares both processes and juxtaposes the bundling effect of P3 contracts next to the fragmented procurement of traditional contracts. P3s can engage the private sector for any part of the contract, although, most projects in the United States typically bundle the design-build-finance-operation, and maintenance (DBFOM) components of a project. Figure 2.7 shows private engagement degrees of P3 arrangements.

Figure 2.6



Source: Legislative Analyst Office

Figure 2.7

P3 Options					
New Build Facilities	Private Contract Fee Services	Design Build	Design Build Operate Maintain	Design Build Finance	Design Build Finance Operate Maintain Concession
Existing Facilities	O & M Concession				Long Term Lease Concession

Source: Federal Highway Administration

According to the Federal Highway Administration, the following options explain the partnership between public and private entities among P3 agreements:

Design-Build: Design and construction work procured under one contract where a single firm or coalition of firms bear the responsibility for a fixed fee. The public sector retains the responsibility of financing, operating, and maintaining.

Design-Build-Operate-Maintain (DBOM): A private entity is contracted to deliver construction, design, operations, and maintenance. The public agency finances the project and bears the risk of operating revenues.

Design-Build-Finance (DBF): The private entity bears the responsibility for construction and design work, as well as the short-term financing for the project in exchange for a fixed fee. The public agency is responsible for long-term operation and maintenance.

Design-Build-Finance-Operate-Maintain (DBFOM): The public agency bundles all components of a capital improvement project into one contract. Under this contract the private entity is paid based on two forms of payments involving concessions or availability payments. The project is usually financed based on debt leveraged from these revenue streams.

D. Problem Statement

Ultimately, as California's population and infrastructure needs grow, sustained levels of economic productivity, given eroding asset quality and capacity, will no longer be possible. Given the state's already exorbitant tax rates, funding projects through revenue sources generated from further increases in gas tax and other user fees is not a sustainable mechanism for growth. Similarly, traditional financing tools, including bonds and loans, are leaving the state vulnerable to high levels of debt service. Given these circumstances, our problem statement is as follows:

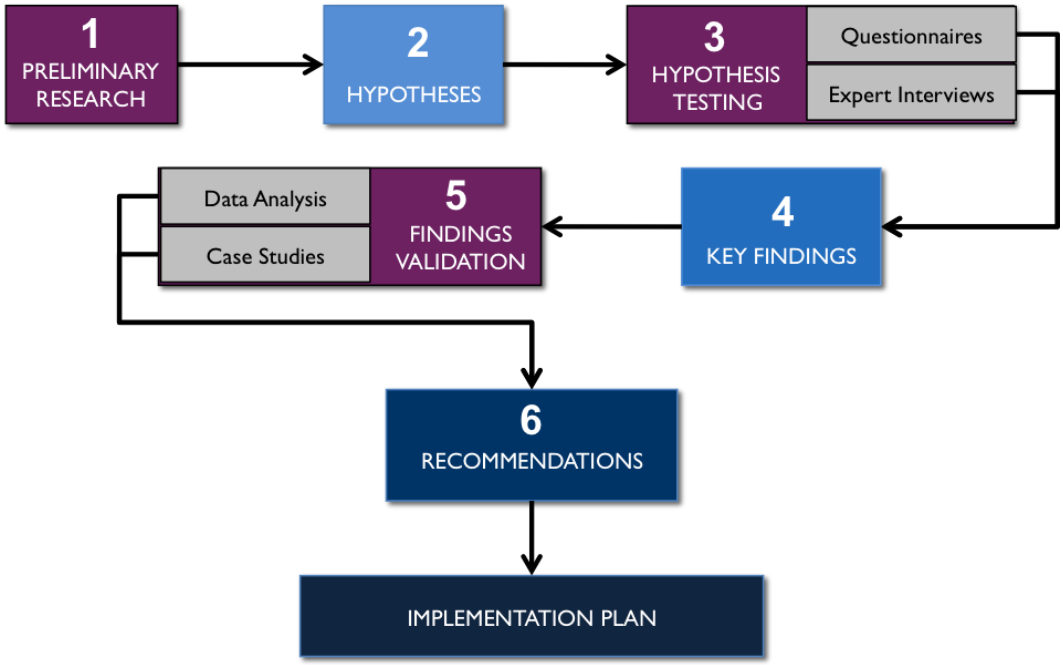
Traditional public funding sources and financing tools cannot keep up with California's growing infrastructure needs. Are there feasible options for alternative financing strategies involving the private sector that could help close the widening funding gap?

III. Methodology

The topic of infrastructure delivery in California is complex and involves diverse stakeholders with fragmented division in responsibility for project delivery. To gather a full picture of the industry, AMR Team 14 conducted

extensive primary and secondary research. In total, over 100 hours of primary research were completed, speaking with more than 40 industry experts. The graphic below and ensuing sections summarize the methods employed.

Figure 3.1: Methodological Approach



A. Phase 1: Preliminary Research

To begin, the team assessed the current state of infrastructure development in the United States and California specifically. Analysis focused on identifying market participants, traditional methods utilized to develop, finance and deliver infrastructure projects at the national, state and sub-state level in addition to understanding and identifying emerging forms of alternative financing mechanisms used both domestically and abroad which have the potential to assist in closing the current infrastructure investment gap across the state of California. Specifically, preliminary research was conducted following the below methodology:

i. Identified key stakeholders groups involved in both traditional and P3 structures for infrastructure delivery.

ii. Stakeholders identified were categorized into 'buckets' based on functional role performed during P3 transaction -- three key stakeholder groups emerged:

1. Alternative Models

Definition: existing quasi-public entities that provide financing for public infrastructure, seen to be potential models for California.

Example: Rhode Island Infrastructure Bank

2. Financial Partners

   Definition: financial services companies or investors focused on the infrastructure sector

   Example: InfraRed Infrastructure Partners

3. Industry Partners

   Definition: experts in the field of infrastructure investment and delivery, spanning advisory services, research, and implementing organizations.

   Example: West Coast Infrastructure Exchange

Once categorized, the team stack ranked participant groups in order of importance and influence on the P3 process (determined by the following criteria: involvement in the P3 process domestically, relevant knowledge base as it pertains to P3 projects in the United States, and the strategic question that guides the report herein).

B. Phase 2: Developing Null Hypotheses

The second phase of project research was focused on developing preliminary hypotheses as they pertained to the project problem statement and scope. These hypotheses were postulated from insights found in initial market and industry analysis. Null hypotheses to be tested during the third project phase included:

i. Existing debt capacity of state governments is insufficient to meet infrastructure needs.

ii. There is a role for increased participation of the private sector in delivering transportation infrastructure in California, particularly through public-private partnerships.

iii. Lack of private expertise in the U.S. P3 market is caused by: the lack of interest from private capital sources.

iv. Unrealistic allotment of risk from government to private partners has been a barrier to market growth.

v. There are models of quasi-public institutions, both domestic and international promoting private participation in infrastructure that can serve as instructive models for adaptation to California.

vi. The California Infrastructure and Economic Development Bank is a prime candidate for evolution into a statewide such an institution.

vii. It is feasible to scale state and regional infrastructure banks to the national level.

C. Phase 3: Hypothesis Testing

Next the team tested the validity of the preliminary hypotheses through primary research. Specifically, the team developed pre-interview survey questionnaires tailored to the stakeholder groups' functional capacity and

incentive structure in a P3 transaction. Two different surveys were developed: one for Financial Partners and one for Alternative Models. The complete surveys are included in the Appendix. Sample survey questions included:

- *What is the greatest barrier to scaling up investment in California's transportation infrastructure?*
- *What are the most significant barriers to leveraging private financing for P3s in California?*
- *What are the most critical factors in determining whether to engage in a P3?*

Pre-interview survey enabled the collection of streamlined data points that would allow for a more accurate comparative analysis to be conducted than if based on recorded in-person interview responses alone. Testing the validity of preliminary null hypotheses also governed approach taken and topics focused on during one-on-one interviews with various market participants.

D. Phase 4: Key Findings

After compiling the qualitative and quantitative results of primary research, the team analyzed the information for major trends and concepts. This analysis led to the development of preliminary key findings. These findings, however, required empirical validation and stress-testing to ensure accuracy.

E. Phase 5: Validation of Key Findings

Team 14 validated our key findings using two research methods: secondary research and proprietary data analysis. Secondary research entailed case studies of existing projects, models, and policies. The purpose of such comparative analysis was to extract best practices pertinent to California. In analyzing these comparators, we normalize for various contextual features like governance structure and legal regime, to ensure conclusions drawn from diverse jurisdictions were comparable entities to the state of California. The team also utilized historical data to validate findings, specifically two proprietary databases: (1) InfraDeals and (2) P3 Bulletin. Both sources contained project-specific data on infrastructure projects domestically and in global markets. The main insights gleaned from analyzing these data points was a better understanding of and importance of selecting appropriate criterion when considering a P3 delivery structure for infrastructure projects (e.g. ticket size, contract length), sector focus, and their proclivity for P3 delivery as value-for-money method of project delivery (as opposed to traditional procurement). Further, data analysis allowed for empirical evidence for comparative use and to better prescribe motivations for P3 utilization in California and other jurisdictions.

F. Phase 6: Recommendations for California Based on Team 14's Findings & Key Takeaways

The final step in our prescribed research methodology was for the team to synthesize evidence and use cases evidenced in existing implementation of P3 structures and previous analyses completed on these existing entities to provide further evidence in support of our recommendations as they pertain to the State of California. These recommendations were further concretized into stages of implementation. Our proposals are framed as suggestions for the state of California, rather than next steps for the client. The underlying assumption being that the client plays a role informing policy and projects in California, and requires conclusions to be framed as though addressed to current policymakers.

IV. Key Findings and Takeaways

Overall, both primary and secondary research data provided evidence to support the notion that there is a strategic opportunity to improve infrastructure delivery in California through greater private sector participation. Private investment—in the form of funding, financing, or assumption of risk in delivery—can be beneficial to the public sector at the state and sub-state level. It can also be attractive to private firms.

A. Benefits of Greater Private Involvement in Infrastructure Delivery

i. **Risk Transfer.** In general, the private sector can better manage capital risk associated with complex infrastructure development projects. All key industry groups mentioned the benefit of private risk transfer as a principal advantage. The amount of risk transfer possible is an influential factor when it comes to evaluating use of private capital for a given project. Private firms are often more comfortable with high-risk projects that might make governments balk; of course, risk requires compensatory premiums on interest rates. The price you are paying to access private funding is the 'premium for insurance'; the risk a government entity is willing is reflected in the bearable financing premium. In practice, public-private partnerships are not expected to encourage 100% private capital financing to deliver infrastructure projects. Rather, there is a balance between private and public capital in any given infrastructure project. Risk transfer also allows the government to keep capital-intensive assets off-balance sheet. And they avoid some financial liability for mistakes or problems. While this transfer comes at a cost, it effectively insulates the public sector from the financial, political, and opportunity costs of rectifying issues with infrastructure delivery.

ii. **Reduced Life-Cycle Costs.** In general, transportation infrastructure spending in the United States is highly inefficient and primarily due to political alliances instead of economic forces[1]. Transferring responsibilities to the private sector can reduce those costs. Although involving private financing can often increase the cost of capital--because interest rates for private firms are above those of tax-free municipal bonds--deferring to the private sector can still reduce the overall cost of an asset spread over its useful life. This so-called life cycle cost can be reduced under the auspices of private involvement. Of course, the true cost will depend on which aspects of infrastructure delivery (ie. design, construction, financing, operation, maintenance) are indeed privatized. Project cost assessments must evaluate the embedded costs of varying degrees of privatization, but there is evidence of private partners reducing governments' cost of providing quality infrastructure.

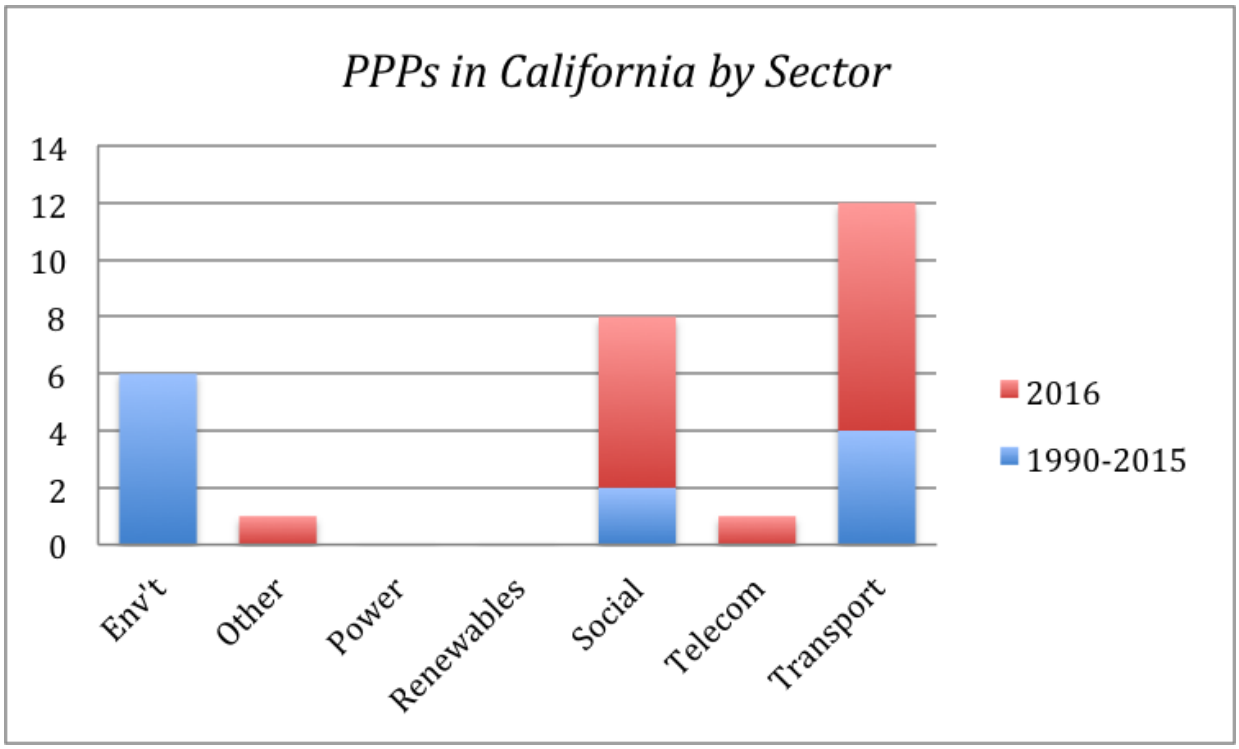
iii. **On-Time & On- Budget Delivery.** Large, complex infrastructure projects are notorious for cost and time overruns. Private firms delivering projects, however, are more easily held to specific benchmarks. Contracts, enforced with appropriate penalties, can ensure that cost and timing expectations are met. Private firms generally operate with more flexibility, nimbleness, and coordination. There is evidence across the world of higher quality design and construction under privatized delivery structures as compared to traditional procurement.

B. The Best Opportunity for Private Involvement In Infrastructure: The Role Of PPPs

Our research indicates that the most effective means of private sector involvement is through Public Private Partnerships (P3). P3s are a delivery tool that allows public agencies to access private capital and transfer risks typically associated with construction and operations. P3 contracts in California have slowly gained popularity and political support. The state has executed twelve P3s in the transport sector since 1990, as shown in the graph below. Eight of those, however, have come in the last year, making the transport sector only recently the leader in P3s. These numbers indicate that the state is ready to move in the direction of enhanced P3 projects.

[1] https://www.mercatus.org/system/files/Krol-Transportation-Funding.pdf

Figure 4.1: In-Depth: P3s in California



Source: InfraDeals 2017.

According to State legislation, infrastructure projects are traditionally required to be procured as either DBB or Design-Build contracts. P3 legislation has opened that gate to allow public agencies engage the private sector in other components of an infrastructure project, in not all: design, build, finance, operate, and maintain. P3s preset an attractive model for delivering certain infrastructure projects, as communities abroad have boasted their on-time and on-budget performances. In 2003, the United Kingdom's National Audit Office reported that 98.6% of P3 projects were delivered on-time compared to 74.1% for traditional procurement, and 95.7% of P3 projects were delivered on-budget in comparison to 82%. Similarly, in Australia, Moody's reported that between 1983 and 2010, 76% of P3 projects were delivered on-time compared to 30% for traditional procurement. Additionally, 78% of P3 projects were delivered on-budget compared to the traditional method at 27%.

Case Study: State Route-91

The SR-91 was one of four initial P3 highway pilot projects that had been approved by SB-680 legislation in California in 1989. The Orange County Transportation Authority (OCTA) entered into agreements with the California Private Transportation Company (CPTC) to build 10 miles of high-occupancy toll (HOT) lanes along the SR-91's most congested segment. The project was delivered using a DBFOM approach where the facility's ownership was transferred back to Caltrans and operations and maintenance would remain the responsibility of the CPTC. The total cost of the project was $135 million and was financed by a combination of $65 million in variable-rate bank loans, $35 million in fixed rate bank loans, a $7 million OCTA subordinated loan, and $20 million in equity. Toward the late 1990's however, controversy sparked from the unanticipated hurdle of a non-compete clause that had been baked into the contract that forbade Caltrans from building any extra highway capacity within a one-and-one-half mile corridor on either side of the toll lanes throughout the extent of contract. In order to increase its scheduled capacity on an adjacent State Route, OCTA purchased the asset back for $207.5 million in 2003 to resolve the issue. While this was considered a technologically innovative project, California learned a lesson for future procurement.

Sources: Federal Highway Administration

Case Study: Presidio Parkway

A bulk of American P3 projects are procured as DBFOM contracts that can be arranged to pay the private entity either availability payments or concessions (i.e. user fees). In 2011, Caltrans pursued a public-private-partnership (P3) with Golden Link Concessionaire, a consortium of private companies, to complete the second phase of the Presidio Parkway. The project was bundled as a 30-year design-build-finance-operate-maintain (DBFOM) contract with availability payments, and marked Caltrans first P3 project since their enacted legislation in 2009. The Presidio Parkway is an impressive multimodal node that transformed an old military base into a park, a transportation node, and an interactive open space with enhanced connectivity for pedestrians and cyclists. Financing included $45.6 million in equity, $166.6 million in senior bank loans and $150 million from the Transportation Infrastructure Finance and innovation Act from the U.S. Department of Transportation. Key highlights for this project include a cost savings estimated by Arup and PB at $147 million over traditional design-bid-build. Additionally, the state was able to transfer a sizeable portion of the risks associated with developing this project onto the private sector. These included design and construction risks, operation and maintenance risks, and possible cost escalation due to external factors.

Sources: National Council of Public Private Partnerships; Arup/PB Joint Venture.

C. Barriers to Implementing P3s for Transportation Infrastructure

Despite mounting evidence in support of the many benefits to be gained from utilizing P3 delivery, there still exist major challenges and barriers to widespread public and private sector adoption of P3s as delivery structures. At present, these barriers impede public organizations ability to effectively capture the value potential inherent in the P3 delivery method and must be addressed in order to accelerate market adoption.

Aggregated data collected from survey responses across stakeholder categories, in addition to qualitative insights gained during one-on-one primary interviews, indicated three primary barriers to accelerating emerging market tools such as private capital as an alternative delivery mechanism to traditional public procurement of infrastructure assets. As discussed below, the three most frequently cited challenges include (1) Public optics surrounding privatization of public assets in the US, (2) Institutional knowledge gap between private market participants and public actors and finally, (3) Misunderstanding of P3 benefits. Additionally mentioned criteria can be found in table below.

Figure 4.2: Comparing Perceived Barriers to P3s

Most Frequently Cited Challenges/Barriers to Infra FInance Market Growth

Alternative Models: Most Frequently Cited Challenges/Barriers for P3 Market Growth	RI Bank	CIT	CT Green Bank	LA Metro	UK	NY Green Bank	IO	CA I Bank	WCX	InfraAssociates	AECOM
Base Capital Availability	✔							✔			
Asset Pipeline - Lack of Qualifying Projects	✔				✔	✔					
Institutional Knowledge Gap btwn key stakeholders	✔			✔					✔	✔	
Regulatory Barriers/Lack of Consistency in Legislation acros geographic boundaries, jursidcitions	✔	✔	✔						✔	✔	
Political Optics of Privatization/Value Add	✔			✔	✔					✔	✔
Lack of Organizational Capacity to Manage P3's	✔			✔							✔
Fiscal Constraints of Borrowing Entites (Municiipalities etc.)	✔	✔		✔				✔			
Political Environment							✔			✔	✔
Resistance from Organized Labor				✔	✔					✔	✔
(Percieved) Cost of Private Financing	✔							✔	✔		
Immature Market- Overall Lack of Investor Confildence due to limite dcognizable process, lack of technical expertise in public sector											

i. Public Optics Surrounding the Privatization of Public Assets in in the U.S.

Interviews conducted with policy partners – in California specifically – overwhelming cited the challenge of the poor optics of public-private partnerships. There is a public mistrust of perceived privatization, with public employees and citizens concerned about the potential shortcomings of handing over control of public assets. Of course, this rarely the reality of PPP contracts, but it does drive home the importance of carefully negotiating contracts and managing the public understanding of what private participation means for transportation infrastructure in California. Indeed, poor understanding of P3s represents a challenge for the wider adoption of engaging private capital markets as a mechanism to finance and delivery infrastructure in California.

Interviewees indicate that, within government, select public employee unions are "holding P3s hostage at state level". In particular, there is strong opposition to transportation P3s from PECG (the Professional Engineers in California Government). Their opposition to private equity capital investment into public infrastructure assets stems from concerns regarding the loss of public sector jobs to private businesses. Given that CALTRANS is in charge of O&M, one solution to this obstacle would be allowing the state agency to handle the DB portion of a DBOM contract. However, this makes the investment much less attractive to private sector investors. P3 supporters feel less concerned about alternative financing mechanisms impact on union jobs – estimates obtained through the course of interview dialogue suggest that if legislation were passed to circumvent CALTRANs authority (and thus opposition) that blocks the growth of the P3 market in CA, the agency would lose approximately seventeen (under-utilized) jobs to private sector businesses.

ii. Institutional knowledge gap between private market participants and public actors

Despite growing private capital interest, the lack of government support and a limiting regulatory environment have considerably stymied growth potential for the P3 market domestically. A commonly cited theme during conversations with all stakeholder groups identified was the asymmetry of information that exists between private sector agents and public entities being a barrier to the growth of P3 financing in California and the U.S. Knowledge share is an issue from the view of both domestic actors and established and more experienced international entities, highlighting its importance during all stages of market evolution. Subsequently, domestic and international agencies agreed that knowledge sharing between key participant groups via a central entity or education hub could greatly accelerate market growth for P3s. Further, the centralization of P3 oversight in California could result in a standardization of processes that would lower deal transaction costs and make private capital even more accessible. Finally, given that P3s are not particularly well understood in the U.S., many participants indicated that the term elicits negative connotations in regards to the privatization of public assets at the expense of state constituents. West Coast Infrastructure Exchange explained that "selling the P3 model" through education and information dissemination to state agencies with authority to champion such mechanisms could be a key component for the growing market. Broadly speaking, using a centralized agency to disseminate and educate public agencies in addition to impacted constituents would potentially assist in changing attitudes and eventually the regulatory environments and facilitate growth of the P3 market across the state of California.

Overall, political support plays a critical role in facilitating P3 market development. Strong governance from state actors through authorizing statute guidance or from the creation of dedicated and centralized entities can successfully overcome the challenges that currently exist in the P3 market facilitate increased development. Infrastructure Ontario (IO), the gold standard of successful P3 development vehicles, noted that "all provincial

agencies in Canada such as Infrastructure Ontario have been set up as 'independent crown agencies' at arm's length of government. This structure allows entities to circumvent the influence of government policies on the deal pipeline. IO does not decide which transit system will get built; they only implement projects once the government has decided the projects will be done.

iii. Misunderstanding of P3 benefits

Interviews with both "alternative model" organizations and infrastructure financing partners indicated overwhelmingly the importance of identifying projects with revenue streams or applicable user fees when considering P3 financing. "There has to be a revenue stream one way or another; as an example, for a water project: you can raise rates on customers, but you don't need revenue-generating projects. You need a commitment through the public sector through taxes or some other mechanism to make payments on projects, usually carved out on an annual budget" – WCX. Given the relevance of revenue streams when attempting to utilize this type of financing mechanism, transportation is a more flexible sector that could benefit greatly from P3 financing as compared to energy and water that have high degree of regulation, that has policy support for alternative financing and procurement.

D. Barriers and Challenges to Private Capital Financing for Infrastructure Project Delivery

Data collected early on disproved our preliminary hypothesis that lack of private capital interest in core infrastructure assets was a primary driver in slower than expected P3 market growth domestically. Analysis throughout the research process evidenced the exact opposite, indicating instead mounting interest among private capital participants in public infrastructure to be stemming primarily from financial market forecasts that indicate trends towards diminishing returns on securities in equity and fixed income markets are expected to continue. Analysts project that annual returns expected on US equities will fall from 7.9% to somewhere between 4.0%-6.5%, while US bond returns are also forecasted to see decline in revenue from 5.0% to between 0%-2%, resulting from low interest rates prevalent in today's markets. Additionally, the industry has seen a paradigm shift in recent years in regards to public sector willingness to consider private market participation to delivery given the widening deficit for infrastructure spending and limited to no viable alternative options. The convergence of these two trends reveals a strategic opportunity to accelerate market growth of P3s domestically, given strong political support and public reception. Further, international P3 markets have become more robust and well-developed over the previous decade and in addition, the domestic market has started to mature as pioneering states have successfully implemented comprehensive P3 legislation and frameworks and can provide further direction for state entities as benchmarks for their own implementation framework. Further, successful

development of state—administered programs provides evidence that there is value to be added through private capital participation for delivery of these assets when structured correctly. However, major challenges and barriers to wide spread public adoption of P3 delivery structures still do exist and impede public entities from capturing this value potential effectively until addressed.

E. Motivations for the Private Sector

Primary research conducted with financial partners currently active in the infrastructure financing in both domestic and international markets supported insights found in secondary research, specifically, growing pools of institutional capital seeking long-term fixed income-assets and the private capital investor profiles that fit this criterion. Key stakeholder groups identified the following profiles as targets sources of alternative financing vehicles with potential to be modes of asset financing, including: (1) pension funds (2) life insurance companies and more generally, institutions which hold elongated liabilities in addition to investors seeking an asset class with low levels of market volatility. Further primary research of the 'financial partners' stakeholder groups indicated the primary investment criteria investors were seeking when considering P3 deal structures as potential investment vehicles. The top 3 most mentioned 'benefits-seeking' for investors interested in infrastructure assets included:

(1) Diversification of portfolio through infrastructure asset investment

(2) Long-term return of investment

(3) Stability of cash flows provided by the financing the assets development.

The mentioned selection criteria in relation to P3 financing models indicates that private capital sources are looking for infrastructure projects with a cash flow return horizon of >25 years (bottom threshold identified by majority of survey participants) in addition to seeking projects to finance and deliver when they encompass a clearly defined revenue stream (e.g. user fees, toll collection) and require up-front capital of more than $100M. The highest threshold for average project size looking to finance varied greatly and correlated with size of AUM for the given institution in question.[2] Of course, this advantage is a trend not a rule. There are still many cases of privately financed and delivered projects arriving over-budget and behind schedule.

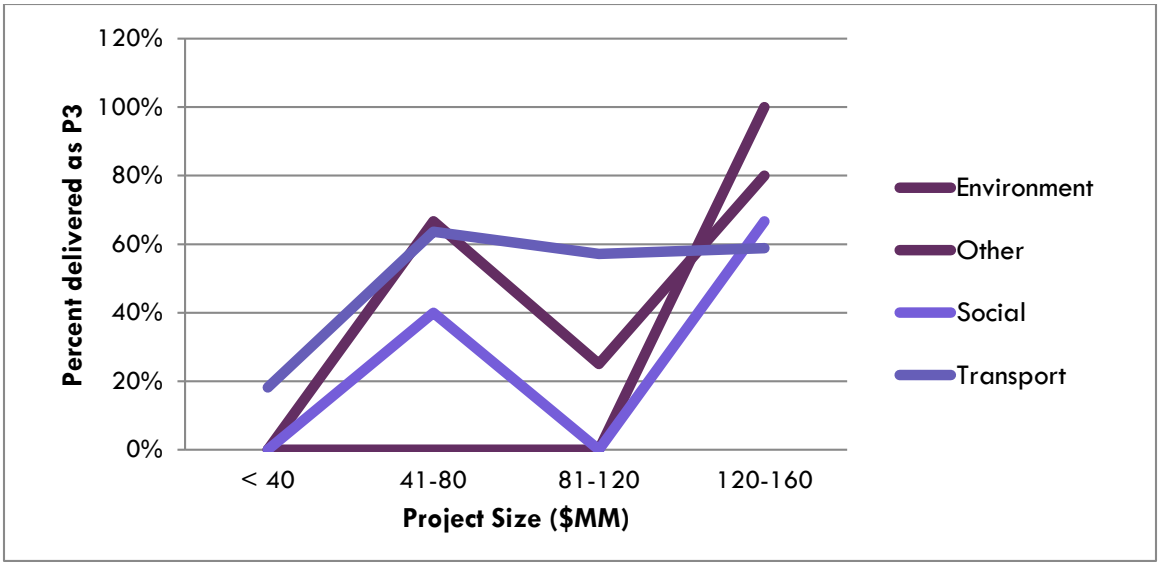
[2] http://www.ipfa.org/industry-resources/benefits/

Figure 4.3: Vetting Criteria

Project Selection Criteria:	QIC	LTIA	MS	PAP	InstarAGF	InfraRed	IFC	MSNIG
IRR Expected	7-15%	12-15%	7-15%	7-12%	10-14%	8-10%	15-25%	7-12%
Project Size	>$100M		>$100M		$100-$150M		$100-$500M	$100-$200M
Defined Revenue Stream	x	x	x			x	x	x
Project "Essentiality" (less political risk)			x					
Project Complexity (Risk)		x	x	x	x	x	x	x
Length of Debt & Public Entitys Ability to Service Debt							x	x

Figure 4.3 depicts a sample of aggregate survey data tat indicates that vetting criteria P3 structures among institutional investors are relatively standardized across funds for both domestic and international actors. These results align with the statistical analysis of infrastructure project data. Figure 4.4 shows the correlation between project size (in USD) and propensity for utilizing a P3 delivery method. Expected IRR for project investment varies slightly for emerging market investors such as IFC, where risk premium is higher than would be for financing projects in more established markets such as the United States. Public agencies reviewing deal proposals should solicit private capital for financing when potential infrastructure projects include these criteria to better utilize potential for alternative financing of projects in pipeline.

Figure 4.4: Relationship of Size and P3 Utilization in US Infrastructure Projects



Source: InfraDeals 2017.

Despite the volume of recorded interest by private sector stakeholders, exhibited during primary interviews and through secondary research, indicates a strategic opportunity to capitalize on for the U.S. Infrastructure Finance market, particularly state actors who are seeking to identify alternative mechanisms for financing infrastructure development.

F. Other Roles for The Private Sector in Infrastructure Delivery

In addition to P3 project delivery—through assuming risk and/or raising private capital, there are other ways for private actors to participate in infrastructure delivery. Creative agreements between governments—either local or state—and private firms can take many forms. With the advent of new technologies, particularly things like ridesharing or geo-location, new opportunities for private involvement in the transportation sector are increasing. One long-standing means of involving the private sector in transportation infrastructure is through land value capture.

i. Land Value Capture

The practice of land value capture--best understood as recovering all or some of the increase in property value generated by public infrastructure investment--is commonly enacted at the local level. The premise behind land value capture is that public infrastructure (such as transportation assets) is generally a public good, and improvements to it cover broad, positive externalities. There are mechanisms to capitalize those benefits to private firms and citizens into revenues for local governments. For example, land value generally increases around newly installed public transportation infrastructure; land value capture would extract value from those properties experiencing a value increase due to government activity.

There are various mechanisms of land value capture, but all have structural drawbacks [for scaling up to the California state level]. Examples include Infrastructure Financing Districts, Tax-Increment Financing, Transferable Development Rights, Development Agreements, Betterment Contributions, and Building Rights Sales. These are inventive ways of raising revenues or expanding financing for infrastructure. These strategies, however, are contingent on local development projects. As such, the major drawback to land value capture in general is the difficulty in scaling up. Mechanisms are poorly suited to large-scale transportation projects that cross jurisdictions.

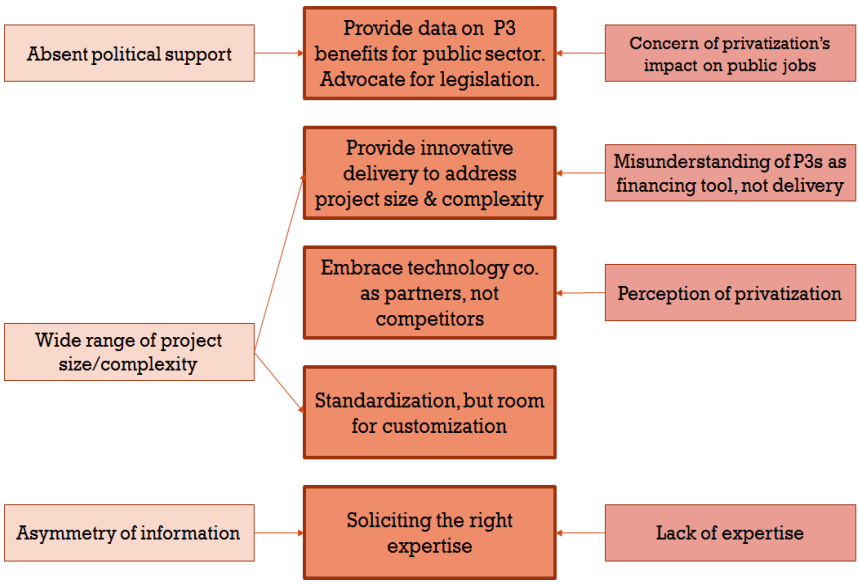
In theory, it could be possible to scale up land value capture. High Speed Rail, for example, will create opportunities across the state. The challenge, however, is that land value capture depends on uniform increase in land values as a basis for extracting rents from the private sector. Scaling, therefore requires a large area that is assured to increase in property value. The larger the area, the riskier the bet.

G. What Strategies Can Be Employed to Overcome These Barriers?

These barriers are surmountable. California has unique and complex challenges requiring a multi-dimensional approach. Still, the state can build on other jurisdictions' successful augmentation of the role of the private sector in transportation infrastructure delivery. Specifically, we identify five pressure points: improved policy

environment, innovative project design, better incorporation of technology, greater standardization, and engagement with pre-existing expertise.

Figure 4.5



1. Advocate for legislation to permit broader private sector participation

Strategies for improving the environment for private participation in transport infrastructure must start at the policy level. There are numerous dimensions to such an effort. Education of public officials is still needed--a role that can be seized upon by non-profits, advocacy organizations, and universities. Private organizations can also partake in lobbying efforts, and should focus on the expanded infrastructure, job creation, and efficiency opportunities that comprehensive P3 legislation can provide. There are several states with comprehensive legislation to be emulated. Aspects of policy from New York, Virginia, Texas, and Colorado can be applied to California. As shown in the data table below, P3 legislation ranges on spectrum of comprehensiveness, state entities can better facilitate effective P3 institutional structures based on legislated authority and frameworks provided in authorizing statute.

Figure 4.6

COMMONLY ADDRESSED PROVISIONS IN P3 ENABLING STATUTES	
General	**Goverance**
Public Entities Authorized to use P3s	Legislative Involvement
Design Build Authorization	Other Governmental Involvement
Any broad limitations on P3 use	P3 Advisory Bodies
Project types	
Proposals	**Funding and Finance**
Solicited vs. Unsolicited Bids	Tolls (for transportation P3s)
Bidder Confidentially and Fees	Revenue Sharing
Publicly Hired Consultants	Combination of State/Local/Federal Funding
Public Comments/Hearings	Exemption for certain taxes
Other	
Specific Provisions in P3 Agreements	
Cost-Benefit Analysis	
Labor Issues	
Material Default/Bankruptcy	

2. Innovative delivery to address project size and complexity

Present data shows that in most cases, P3 delivery is considered a viable option for projects above $100M in total cost due to transaction costs and legal fees involved in the process. (Can we refer to the cost size chart here, appendix?) This does not mean municipalities with lower cost projects cannot use innovative tactics to employ the P3 model and optimize its benefits.

1. Bundling

Bundling projects is one such tactic that illustrates how demand aggregation for infrastructure development could be an effective use of P3 delivery. For example, InfraRed bundled bridges for a project to cut time required for the build phase. It is the role of a centralized agency to identify, source, and structure deals that deploy this concept.

"Project aggregation makes sense within clearly defined boundaries; for example, Pennsylvania bundles 500 projects. Across political boundaries it's hard to Institute a regulatory hammer" – CT Green Bank

One prime example of P3 bundling comes from Pennsylvania, where the state transportation department crafted an innovative plan for bridge maintenance. The Pennsylvania Rapid Bridge Replacement project will be

repairing and maintaining hundreds of bridges across the state through a DBFOM structure. The state estimated that its traditional procurement process could complete the project at a cost of $2 million per bridge. Because of the economies of scale and private sector efficiencies in project delivery, the price tag for the state government will be $1.6 million per bridge (US DOT 2016).

Case Study: Bundling Bridges in Pennsylvania

There are hundreds of structurally deficient bridges across Pennsylvania. To address the large-scale repair and maintenance issue, the state transportation department launched a P3 project to bundle together 558 bridges. In DBFOM project based on availability payments over 25 years. The state entered an agreement with Plenary Walsh Keystone Partners, who raised $59 in private equity and $793 million in private activity bonds raised through the Pennsylvania Economic Development Authority. The contract is underway and delivery is proceeding on time and comparatively under-budget. PennDOT maintains that the project is proceeding at a lower cost than if it had been a traditional public procurement. The state is contracting its monitoring and evaluation through consultants, which could be amended if there were a more centralized and specialized workforce within the state dedicated to P3 development.

Sources: BATIC Institute 2015; Federal Highway Administration 2016

http://www.financingtransportation.org/pdf/events/PABridgesFinal11-4-15.pdf; https://www.fhwa.dot.gov/ipd/project_profiles/pa_rapid_bridge.aspx

2. Technology

With the onset of Uber, Lyft, and other shared-mobility applications, technology has been perceived to "disrupt" the transportation industry as a competitor to mass transit. After all, federal, state, and local governments spend $0.40 for every $1 spent on highways (Morgan Stanley report here), and increased privatized full-route ride-sharing is thought to lead to further under-utilization of the public transportation systems.

However, public-private partnerships with technology companies can provide benefits for both the public and private sectors. For example, ride-sharing participants are reducing their vehicle miles traveled (VMT) by 27-43% -- achieving the California Department of Transportation's (CALTRANS) goal to reduce per capita vehicle miles traveled by 15% by 2020.

Additionally, these types of partnerships can potentially lead to increased mass-transit utilization. Finding transportation to train stations or other forms of public transit is a common obstacle for travelers (commonly referred to as the "last mile, first mile problem"). Sacramento's Regional Transit partnered with three ride-sharing services -

Lyft, Uber, and Yellow Cab - to offer riders $5 off when they take the ride-sharing service to the light rail -- saving the rider more time and money, and innovatively resolving the last-mile, first-mile problem for some riders.

Technology can play a role in traditional P3 delivery projects as well, from a design perspective. The Internet of Things (IoT) has enabled real-time data collection and analysis across various industries, including infrastructure development. For example, the Hamburg Port Authority worked with SAP and various technology partners to make the second busiest container port in Europe "smart". Sensors on the bridge mention tension and monitors operations, and provides analytics for predictive maintenance to various infrastructure stakeholders through the cloud platform. This system not only increases the structure's efficiency, but also reduces its need for expansion, which would be costly and time-intensive.

3. Standardization

A commonly cited theme during conversations with all stakeholder groups identified was the asymmetry of information that exists between private sector agents and public entities being a barrier to growth of P3 financing in California and the U.S.. Knowledge- share is an issue from the view of both domestic actors and established, more experienced international entities, highlighting its importance during all stages of market evolution. Subsequently, domestic and international agencies agreed that knowledge sharing between key participant groups via a central entity or education hub could greatly accelerate market growth for P3s. Further, centralization of P3 oversight in California could result in a standardization of processes that would lower deal transaction costs and make private capital even more accessible. Finally, given that P3s are not particularly well understood in the U.S., many participants indicated that the term elicits negative connotations in regards to the privatization of public assets at the expense of state constituents. West Coast Infrastructure Exchange explained that "selling the P3 model" through education and information dissemination to state agencies with authority to champion such mechanisms could be a key component for growing market. Broadly speaking, using a centralized agency to disseminate and educate public agencies in addition to impacted constituents would potentially assist in changing attitudes and eventually the regulatory environments, and facilitate growth of the P3 market across the state of California.

4. Soliciting the Right Expertise

Public-private partnerships are considered a fairly new method for delivery in many areas of the United States. Therefore, states and municipalities that have just recently embraced P3s may not have experienced stakeholders to handle procurement, deal-modeling, financing, and project delivery; however, discussions with various experts revealed that certain public and private actors are necessary as part of the process. In fact, Texas mandates that

for every project above $5 million, the proposal must be reviewed by "an architect, professional engineer, and certified public accountant not otherwise employed by the government entity" (i.e. an independent expert). For projects under $5 million in the state, these advisory services can be provided by qualified agency employees.

In addition to the aforementioned participants, infrastructure advisory consultants have had a strong presence in the formation of infrastructure P3 deals in the United States since the delivery model was first instituted. For instance, Jeffrey Parker, the founder and CEO of Parker Infrastructure Partners (PIP), first owned Jeffrey A. Parker & Associates (founded in 1981 and now a part of EY Infrastructure Advisory (EYIA)) and has had over 35 years of experience in the field. He established PIP to provide an interface between the investors and the government. Entities from New York to Florida have utilized his advising services for large projects such as the I-595 PPPs. The right advisors for such projects are out there; it's just a matter of making sure they are a part of the conversation and process.

Case Study: Texas HB No. 2475

On September 1, 2015, Texas passed legislation establishing the Center for Alternative Finance and Procurement. The text of the legislation explicitly outlines requirements for sources of expertise, determined by project cost ($5M):

"*For a proposal with an estimated cost of $5 million or more for construction or renovation under a qualify project, the analysis conducted under Subsection must include review by an architect, a professional engineer, and a certified public accountant not otherwise employed by the government entity.* "

Sources: https://legiscan.com/TX/text/HB2475/id/11553684-15.pdf

5. How can we apply these strategies in California?

In conjunction to general American resistance and generally negative public perceptions in regards to the notion of privatizing public assets – such as core infrastructure - the team initially postulated that the premium cost of accessing private capital would be the largest contributing and most limiting factor accelerating growth of P3 delivery in the domestic market in comparison to the robust growth in use of P3s seen internationally. However, through hypothesis testing it was revealed that while economies of scale are a requirement when considering P3 deal structuring, the regulatory complexity of administering establishing a centralized P3 unit at the national level makes it a practical impossibility. On the other end of the spectrum, P3 vehicles for project delivery at the sub-state level (county, municipality) are rendered ineffective because they do not achieve economies of scale

necessary to make private capital financing a value-for-money proposition, despite potential risk transfer. Figure 4.2 below illustrates the jurisdictional diversity that exists across municipal boundaries throughout the state:

Figure 4.7

	Los Angeles	Merced	Sacramento
Jurisdiction Type	County	County	County
Government Type	Council-Manager		Council-Manager
Voting Threshold	Supermajority	Supermajority	Supermajority
Population	10.388M	276K	1.523M
Total Taxable Sales ($B)	$163.7	$3.24	$24.40
Issuer Credit Rating (ICR)	AA+	A3	A2
Lease Revenue Bond Rating	AA	BB1	A3

For California, even at the state level, fragmented authority and division of responsibility were the most frequently cited challenges and barriers to growth by both the public and private sectors abilities to expedite alternative procurement models for infrastructure delivery. The complex regulatory environment and overall decentralized governance structure are critical considerations when assessing potential strategies for wider adoption of alternative procurement methods for California specifically. To make the best strategic recommendation for California's implementation process for P3 delivery possible, the team created a comparative matrix and identified 5 main criteria that it considered to be most influential in assessing 'alternative organization' structure types that would be most effective in facilitating market growth for P3 delivery in California. Criteria identified were as follows:

1. Comparative public entity identified has executed, facilitated, or administrated on behalf of at least one infrastructure financing & deal proposal that utilized the P3 structure.

   Impact:

   a. *Rules out infrastructure banks as institutional vehicle best suited for delivery*
   b. *Rules out entities which primarily only deploy private financing (and not management of actual project build) -- such as UK Green Bank*
2. Sector Focus: drawing best practices from organizations who have completed P3 project delivery specifically for transportation infrastructure projects. Up-front costs and government regulation, and ability to generate revenue vary greatly across different sub-sectors of infrastructure --- given client focus

is narrowly transportation, key insights for policy and institutional framework should be limited to conclusions drawn from entities who are also engaged i P3 transportation deals.

Impact:

a. *Rules out clean energy banks*

3. Funding Source & Primary Function of organization: Given the complex and varying relationship between stakeholders in this market, comparative insights should also be limited to functions and financing structure (for operating budgets and for financial delivery of project) that are similar to the state of California's.
4. Degree of divergence from California's governance structure and associated geographic scope. As noted above, instituting a regulatory hammer across different boundaries prove to be incredibly difficult; as such, comparative alternative models structures considered for best practices implementation should have a comparable geographic scope to California's state government.

   Impact:

   a. *Rules out regional entities such as WCX*
   b. *Rules out multi-national entities such as IFC*

The complete comparative matrix with all factors for potential consideration can be found in the Appendix.

V. Recommendations

Our recommendations for California are threefold: embark on innovative pilot P3 projects, engage with existing experts in alternative financing of infrastructure, and establish a centralized agency for standards and resources on P3s.

1. Pilot Projects

New types of projects should be tested in order to raise the profile of P3s in the state, build on existing expertise, and to try new strategies that could prove successful. As there are currently eight transportation projects in the state's pipeline, there are ample opportunities to test out new pilots. Moreover, some local jurisdictions are poised to undertake a slew of P3s in the near future. In Los Angeles County, for example, the tax revenue raised through two local sales tax initiatives (Measure M and Measure R) have filled the county's coffers with revenues dedicated to transportation. There are dozens of projects in the pipeline, in the early stages of development, or under consideration by the county transportation authority, Metro.

A. 63-20 Corporations

California should test out the use of 63-20 corporations for P3 projects. The state has already attempted one 63-20 project in its history: the state's first PPP, the poorly executed SR-125. However, simply because the first iteration failed, does not discredit the value of the tactic. Reviving this delivery method would be in California's best interest. The state has improved its expertise in infrastructure delivery, and the new projects in the pipeline could be prime opportunities to revamp the 63-20 model.

B. Bundling

California should test the bundling of local infrastructure projects. California is vast, and there are many local jurisdictions that can benefit from collaboration. Bundling projects can have multiple benefits. The intuitive economic benefit of returns to scale is the most obvious. Bundling also facilitates interaction across local governments, encouraging information-sharing and raising awareness about common challenges across the state. Additionally, bundling can allow for a degree of risk pooling, helping riskier markets (like municipalities with poor credit ratings and low tax revenues) access infrastructure financing in collaboration with more well-off local governments. The returns to scale of bundling should be enough incentive to bring more creditworthy jurisdictions to the table.

What types of California projects are suitable for bundling? There are massive opportunities for investment, as evidenced by the state's outstanding investment need. Some options include: road or highway maintenance (in the style of the PA Bridges); the state's High Speed Rail project-- an example of a bundled infrastructure project that will have ancillary components (eg. first-mile-last-mile infrastructure, rail extensions); regional transit in agglomerated areas with multi-county overlap, like the San Francisco-San Jose-Oakland metropolitan area; or university transportation services spread across public educational institutions.

C. Technology

California should embrace technology to improve infrastructure planning. The state can achieve this in two ways:

1. Municipalities should forge partnerships with technology companies that provide shared-mobility and ride-hailing services to help provide mass-transit passengers access to transportation stations.
    a. A cost-benefit analysis should be conducted to determine whether the partnership would be beneficial for existing transportation centers (on an individual basis).

2. For transportation centers that are currently in the early planning stages or in the pipeline (such as the eight mentioned above), the government sponsor should solicit a cost-benefit analysis to determine the impact of partnering on creating, for example, transportation centers farther apart, as to increase speed of transit and catchment area per station.
    a. Municipality, county, and state-level governments should incorporate technology into infrastructure planning by mandating that the Technical Delivery Team investigate applicable IoT cost-effective operations and maintenance sensors and solutions. The government sponsor, along with the advisory board, should determine which project stakeholders are required to have access to the data collected by these devices, to encourage transparency, accountability, and real-time issue resolution.

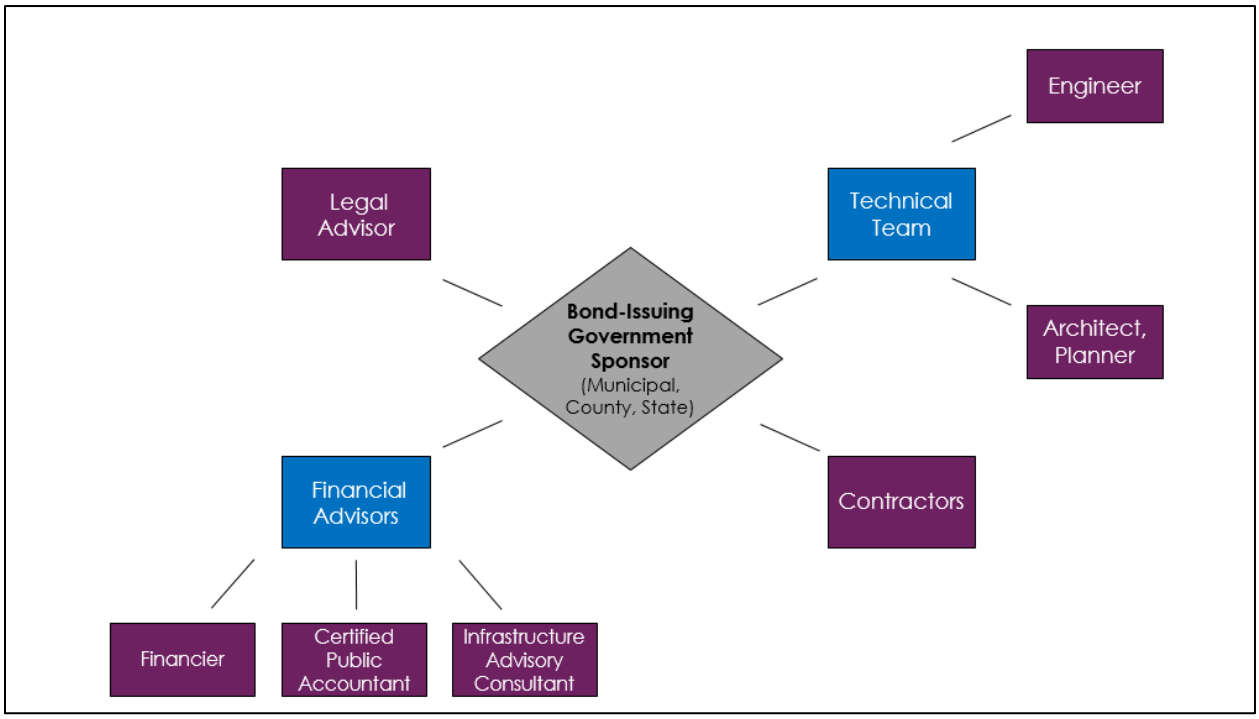
2. Leverage Statewide Expertise

There is plenty of expertise in California on alternative financing, and it should be leveraged. A coalition of experts could be vital for the state, to advise policymakers and demonstrate the volume of deployable capital. There are numerous ways for the state to leverage P3 expertise through experts across industries. Our primary recommendation is to assemble a statewide Board of Advisors.

Statewide Board of Advisors

Research shows the following stakeholders are typically solicited in the procurement and delivery of infrastructure projects:

Figure 5.1: Infrastructure Procurement Stakeholder Map



To ensure these players are involved in a sufficient capacity, California should develop a Statewide Board of Advisors. The Board should include the government entity sponsoring the project, a technical team to advise on the feasibility of infrastructure build and design (and guidance on operations and maintenance requirements), a legal advisor for documentation and legal approval, a finance team (including an experienced investor, a certified public accountant, and an infrastructure advisory consultant who has had experience with deal-modeling and financial analysis). The Board should meet monthly to review project proposals submitted to the body by the government entity.

Fees to cover the Board's standard proposal review should be included in the project cost, and be provided by the government entity. Depending on the deal-model chosen, the entity can choose to pay for the proposal review fee through general revenues from the infrastructure project (including user fees) instead of providing the payment upfront (with the approval of the Board). To streamline and minimize the cost of proposal review, the consulting services typically provided at the local level are provided through the Board (specifically by the infrastructure advisory consultant) and included in the overall proposal review fee. Municipal governments may choose to still pursue proposal review from external advisors in the short-term; however, a central Board of Advisors is expected to reduce this need in the future. Because the fee is on a per-proposal basis, the

government sponsor shall be encouraged to internally review each proposal before submitting the proposal to the Board.

Figure 5.2: Board Member Descriptions

Member Group	Description	Areas of Expertise	Involvement
Government Sponsor	Bond-issuing authority, representing the municipal, county, or state government	• Identifies need for infrastructure projects and solicits proposals • Engages financiers through this process • Provides criteria for proposal selection • Works with stakeholders to structure deal • Monitors delivery	- Project Initiation - Deal Formation - Payment Process - Project Delivery
Technical Delivery Team	Engineer and architect. May be employee of government agency (or hired directly by the agency)	• Proposes infrastructure design • Evaluates physical feasibility of project • Recommends technology utilized for delivery	- Project Initiation - Deal Formation - Project Delivery
Legal Advisor	Procurement specialist with a legal background who can advise on legislation & policy	• Assesses applicable policy and legislation • Creates contracts and documentation • Reviews documentation	- Project Initiation - Deal Formation
Financial Advisors	Third party advising entity with P3 deal modeling and delivery experience. Includes financier,	• Formulate deal structure • Advise on deal attractiveness to investors • Conduct cost/benefit analysis • Assess opportunity cost	- Deal Formation - Project Delivery

3. Create a Centralized Agency to Establish and Provide P3 Oversight and Advisory

California should invest in a centralized source of P3 intelligence for the state. Establishing centralized P3 units at the state level serves several purposes:

- Tackle bottlenecks generally present in the P3 process and provide oversight to ensure delivery method is used in the best interest of the public. Oversee potential for aggregating projects across districts, development of protocols and process establishment that will foster growth in the market
- Streamline documents utilized throughout delivery process (RFP, RFQ, Bid Proposals, Bid-Launch) through state implemented guidelines and frameworks has proved to be a valuable tool for current state administered organizations who are active in the P3 financing market. Streamlining procedures produces cost efficiencies related to reduce transaction advisory services required, promotes knowledge sharing on best practices for jurisdictions state-wide who have varying levels of need in terms of education and technical expertise and also and increases investor confidence in the viability of projects soliciting private participation and institutional knowledge of public sector actors involved.
- Create the organizational capacity for the state to accept and review unsolicited bid proposals and overall manage the complexities involved with structure P3 delivery for infrastructure

- Build strong relationships and gain support across stakeholder groups at both organizational level and project-specific.
- Public Education and out reach, facilitate transparency in P3 process. Virginia, a pioneer among states in the country involved in the P3 market, has defined one of the core responsibilities of its centralized dedicated P3 unit to be public education and outreach. Engendering public support and facilitating transparency in the process can greatly alleviate political pressures on actors involved in the process.

The single source can be responsible for a spectrum of activities ranging from advisory services on P3 feasibility, to the creation of standard documents and protocols for private partners, setting standards for P3 project screening or selection criteria. Such activities are currently either unaddressed, contracted out to large consulting firms, or provided in rare cases at the local level. The team conducted an analysis of state-administered organizations (Appendix G: Comparative Table of Current State-Facilitated P3 Units located within the government) to determine what lessons could be learned and utilized for California specifically. Interesting findings that could be utilized in application to California is the operating budget source utilized by Michigan – although located within the government, the Michigan P3 unit is intended to become self-sustaining. They established an innovative financial structure in which transaction costs associated with advisory services provided by the state during deal process are included in closing costs of final financial agreement. Given California's rising budget deficit, if utilizing the general fund for operating budget appropriated for a dedicated P3 unit is not financial feasible, they may want to consider an alternative option such as Michigan. Other states and Canadian provinces have engaged in this centralizing exercise with positive results. Infrastructure Ontario (IO), for example, a provincial entity that oversees P3 financing within the robust and mature Canadian Infrastructure development market cited process standardization as a critical component of IO's success as a vehicle to facilitate alternative financing for infrastructure in Canada. Through experience, IO found the importance of not 'reinventing the wheel' on every project – "you have to have standardization of the deal across projects – this has been a critical success factor for IO and subsequently resulted in a lot of new entrants in the market". Through experience, they have certain processes they have set up that are common across every deal e.g. documents such as project agreement, contract provisions have been template and become as standardizes as they can get. This not only increases comfort of lenders but also private equity investors given they no longer have to allocate as much time and resources on due diligence. Confidence and trust in the process and amongst key stakeholders/partners has been a primary driver of growth of infrastructure industry in Ontario".

Figure 5.3: Formation of Statewide P3 Agencies

	TxDOT----------> TX CAFP		WSDOT ------> TPO	
	Year	Description	Year	Description
P3 Legislation Date Enacted & Description:	2005	TxDOT enabled financing of transportatoin infrastructure using Comprehensive Development Agreements (CDAs) (equivalent to P3's)	1991	Public Private Intiatives in Transportation (PPI) enacted; program within WSDOT charged with adminitering
Dedicated P3 Agency Created:	2011	Amended 2011 bill and established procedure for procurement of P3	2006	P3's for trans. Infrastructure;; launched Transportation Innovative Partnership Program (TIPP) and est. Transportation Partnerships Office
Structure Type:		Public Agency		Public Agency
P3 Unit Type:		Not Dedicated	Dedicated	
Location in Government:	TxDOT; TFC	Texas Department of Transportation	WSDOT, WTC	Administered by Department of Transportation; final approval authority is WS Transportation Commission
Organization Size:				
Funding:		Allocation from state budget specifically for transport P3 oversight in TxDOT	$711K	State Budget allocated funds for TPO operating budget
Primary Function of state agencies:	TxDOT	1) consult w gov entities on best practices for procurement & financing and (2) assist in receipt of proposals, negotiation of interim &	WSDOT	Responsible for Administration and oversight of transporation P3 delivery

i. "Ask the Hard Questions"

There will be opposition to centralization of P3 services at the state level. In particular, local governments with pre-existing protocols and resources may not feel the need to participate in state-level activities; and state actors currently leading transportation delivery may see the expansion of private participation as an appropriation of their responsibilities. However, there are advantages to greater private involvement in transportation projects. Convincing agents across the state of that value requires asking hard questions and marshalling specific data. Strategic communication tailored to different audiences must be used to address opposition to privatization efforts. A regional government commented in an interview that there was strong opposition from public engineers to expanded P3 activity facilitated through a centralized agency. Convincing engineers otherwise required a rigorous quantitative comparison of public versus private infrastructure provision—i.e. speaking the right language. Moreover, in the long term, the ability to centralize P3 expertise for the state will generate more public sector expertise in house, meaning more government jobs and reduced reliance on expensive consultants.

VI. Implementation Plan

In implementing these recommendations, there will be a need to mitigate risks, as shown in the table below. If ITS can successfully guide California to move forward with these strategies, it could transform mobility in the state. California could become a leader in transportation infrastructure delivery while promoting economic development and maintaining fiscal stability.

Figure 6.1

Recommendation	Short-Term (6 mos.-1 yr.)	Mid-Term (10 mos.- 1 yr.)	Long-Term (>1 year)
#1: Pilot Projects a. 63-20 b. Project Bundling c. Technology	**Action**: Consider possible projects in the pipeline. **Risk:** Non-applicability to all project types. **Contingency:** Thorough vetting analysis. **Success Metrics:** Cost-benefit and Value for Money analysis.	**Action**: Forge project partnerships. **Risk:** Lack of partnership incentive. **Contingency:** Customized evidence of partnership value **Success Metrics:** Stakeholder and benefit analysis.	**Action**: Execute and document project. **Risk:** General project risks (eg. cost overrun). **Contingency:** Consult a board of advisors to plan project delivery. **Success Metrics:** Project execution data (eg. opportunity cost).
#2: Statewide Board of Advisors	**Action**: Create services and operations plan. **Risk:** Soliciting the right expertise. **Contingency:** Require referrals or create an RFP. **Success Metrics:** Benchmarking against stakeholder map.	**Action**: Create board and start advising. **Risk:** Sow on-boarding of local governments. **Contingency:** Promote board model benefits. **Success Metrics:** Local governments signed up for advice.	**Action**: Phase board into Central Agency (Rec#3). **Risk:** Political reluctance. **Contingency:** Provide applicable incentives. **Success Metrics:** Central Agency positions filled by board members.
#3: Central Agency	**Action:** Determine agency role and location (e.g., with CA iBank). **Risk:** Poor buy-in from entity stakeholders. **Contingency:** Make stakeholders more involved in discussions. **Success Metrics:** Formal role description and documentation.	**Action:** Establish scope and tasks based on industry benchmarks. **Risk:** Possible legislative hurdles. **Contingency:** Include policymakers in the discussion. Advocate for standardization. **Success Metrics:** Scoping document.	**Action:** Publish standardized processes and practices. **Risk:** Obsolescence of material and approach. **Contingency:** Update documentation often (e.g. every six months). **Success Metrics:** Successfully delivered projects.

VII. Appendix

A. Case Studies

CASE: SR-91

The SR-91 is a 10-mile high-occupancy-toll (HOT) lane highway that was financed and constructed through a P3 contract in 1995. The SR-91 was one of four P3 highway pilot projects that had been approved by SB-680 in 1989. In an effort to connect residents between Orange County and Riverside County communities, the Orange County Transportation Authority (OCTA) pursued one of the first ever P3 contracts the State of California has ever procured. In 1990, OCTA entered into agreements with the California Private Transportation Company (CPTC) to build 10 miles of toll lanes along the SR-91's most congested segment.

The project was delivered using a DBFOM approach where the facility's ownership was transferred back to Caltrans and operations and maintenance would remain the responsibility of the CPTC. CPTC generally had control over the tolls; however, Caltrans had set a cap on their rate of return. The total cost of the project was $135 million and was financed by a combination of $65 million in variable-rate bank loans, $35 million in fixed rate bank loans, a $7 million OCTA subordinated loan, and $20 million in equity.

The HOT Lanes were an innovative congestion-relief tool for Orange County that was the first in the country to use peak vs. non-peak congestion pricing. The toll lanes were also free of toll booths and engaged drivers electronically. Within the third year (1998), toll revenues were covering operation expenditures as well as all debt service – except for a subordinated loan that constituted less than 10% of the total cost and did not need to be repaid in the short term. Travel times also improved in the short term. By 1996, experts recorded that travel time along an 18-mile segment of the eastbound highway that included the toll lanes had reduced from 70 minutes during afternoon peak hours in 1995 to less than 30 minutes in 1996.

Toward the late 1990's however, controversy sparked from the unanticipated hurdle of a non-compete clause that had been baked into the contract. Originally, the OCTA had negotiated a 35-year franchise with CPTC that included a clause forbidding OCTA or Caltrans from building any extra highway capacity within a one-and-one-half mile corridor on either side of the toll lanes throughout the extent of contract. In the late 1990's, however, Caltrans proposed connecting a newly built separate toll road – Eastern Transportation Corridor – with the SR-91 to increase safety as commuters transitioned from one road to another. While safety concerns could override the non-compete clause, the proposal to introduce merger lanes sparked significant controversy and disagreement between the public and private sectors. OCTA finally purchased the asset back for $207.5 million in 2003, resolving the issue.

Sources:

http://www.accessmagazine.org/wp-content/uploads/sites/7/2016/07/Access-25-05-Lessons-From-SR-91.pdf; https://www.fhwa.dot.gov/ipd/project_profiles/ca_91expresslanes.aspx

CASE: Presidio Parkway

In 2011, Caltrans pursued a public-private-partnership (P3) with Golden Link Concessionaire, a consortium of private companies, to complete the second phase of the Presidio Parkway. The project was bundled as a 30-year design-build-finance-operate-maintain (DBFOM) contract with availability payments, and marked Caltrans first P3 project since their enacted legislation in 2009.

The Presidio Parkway is an impressive multimodal node that transformed an old military base into a park, a transportation node, and an interactive open space with enhanced connectivity for pedestrians and cyclists. The improvements totaled $1.1 billion of enhancements and road linkages that were delivered in two phases. The first was constructed and designed through a more traditional design-bid-build process. The second phase was contracted through a P3 process and consisted of the construction of a northbound High Viaduct and Battery Tunnel, two Main Post Tunnels, realignment of the 1 and 101 State Highway Interchange, and direct linkage to the Presidio through a new Girard Road Interchange. Construction began in 2012 and opened to the public in 2015. Ultimately, the Presidio Parkway has transformed an outdated roadway into a well-connected system of roadways that link pedestrians, cyclists, and tourists to San Francisco's Presidio National Park.

Before procurement, Arup and Parsons Brinckerhoff were hired in a joint venture to evaluate the best methods for procuring the project and were tasked with comparing the state's traditional method of design-bid-build against P3 options for a Design-Build-Finance (DBF) or DBFOM. This Value-for-Money (VfM) analysis concluded that the DBFOM produced a final cost that was $147 million lower than the other two options. Beyond lower cost, Arup and PB added that there was an optimal transfer of risk and operations and maintenance service, as well.

Despite controversy among the Legislative Analyst Office (LAO) and the Professional Engineers in California Government Union (PECG), Caltrans was lawfully authorized to pursue this partnership. Financing included $45.6 million in equity, $166.6 million in senior bank loans and $150 million from the Transportation Infrastructure Finance and innovation Act from the U.S. Department of Transportation. The contract called for an availability payment style contract for 30 years passed its 3-year construction timeline.

Key highlights for this project include a cost savings estimated by Arup and PB at $147 million over traditional design-bid-build. Additionally, the state was able to transfer a sizeable portion of the risks associated with developing this project onto the private sector. These included design and construction risks, operation and maintenance risks, and possible cost escalation due to external factors.

Source: https://en.wikibooks.org/wiki/Public-Private_Partnership_Policy_Casebook/Presidio

CASE: Pocahontas Parkway

One of the country's first transportation PPPs financed through a 63-20 corporation was the Pocahontas Parkway in central Virginia. The nine-mile, four-lane SR895 toll road serves the southwestern suburbs of Richmond, VA. It began from an unsolicited proposal from Fluor Daniel and Morrison Knudsen's (FD/MK), the first project initiated by Virginia's 1995 transport P3 enabling legislation. The state transportation department (VDOT) entered into a Design-Build agreement with FD/MK for a lump sum amount of $324 million.

The contract was executed in 1997, when VDOT and FD/MK created a joint 63-20 public benefit corporation, the Pocahontas Parkway Association (PPA). The financing came from 354 million in tax-exempt bonds and $27 million in public grant money. Proceeds from fundraising were deposited into a revenue fund, with carved out allocations for certain activities and recipients. The contract included numerous incentives on both sides of the negotiating table. FD/MK received fees for pre-development risk and paid fees for late delivery; both public and private sector parties were given opportunities to terminate the contract under certain conditions.

Completion of the Pocahontas Parkway was late—in 2004 rather than 2002. Allegedly this was due to labor shortage issues from sponsor subcontractors and longer than expected negotiations. After completion, the PPA managed operation of the toll road, but it underperformed expectations and eventually became a financial liability for VDOT. In 2006, the Pocahontas Parkway was acquired for 90-year lease by Transurban, who expanded and operated the asset until 2015. It is now held by a consortium of banks and continues to operate privately under DBi Services.

While the asset itself has underperformed projections, the 63-20 financing can be characterized as a success. Moreover, the risk transfer enshrined in the PPP structure has inured VDOT to the worst impacts of poor performance. Finally, this project was executed very early in Virginia's history with PPPs, before even the state created the OTP3 office that provides standardization and supplemental expertise.

Sources: Shingore 2009; Martz 2014

https://theses.lib.vt.edu/theses/available/etd-01172009-185137/unrestricted/Final_02_10_09.pdf;
http://www.richmond.com/news/article_94f7e91f-e346-57c4-807d-fd7c60fcdb64.html

CASE: Bundling Bridges in Pennsylvania

An exemplary case of bundling among transportation PPPs is the Pennsylvania Rapid Bridge Replacement Project. There are hundreds of structurally deficient bridges across Pennsylvania, the bulk of which were entering unacceptable states of disrepair from 2015-2020. To address the large-scale repair and maintenance issue, the state turned to another state's bundling effort, the Missouri Safe & Sound Bridges Program of 2008. While the Missouri project contracted out the work, however, Pennsylvania decided to transfer project risk entirely to the private sector.

The state's Rapid Bridge Replacement Project requires a private partner to self-finance and deliver the maintenance of 558 bridges. It is a DBFOM project with repayment structured through availability payments over 25 years. The RFQ was released in 2013. In 2015 the contract was closed with a consortium called Plenary Walsh Keystone Partners.

The financing drew on debt and equity sources. About $59 million came from in private equity investors. Another $793 million came from private activity bonds, raised through the Pennsylvania Economic Development Authority. Availability and milestone payments comprised $260 million, and an additional $5 million came from earned interest during construction.

The contract is underway and delivery is proceeding on time and comparatively under-budget. PennDOT maintains that the project is proceeding at a lower cost than if it had been a traditional public procurement: roughly $1.6 million per bridge instead of $2 million. The state is contracting its monitoring and evaluation through consultants, which could be amended if there were a more centralized and specialized workforce within the state dedicated to P3 development.

Sources: BATIC Institute 2015; Federal Highway Administration 2016

http://www.financingtransportation.org/pdf/events/PABridgesFinal11-4-15.pdf;
https://www.fhwa.dot.gov/ipd/project_profiles/pa_rapid_bridge.aspx

B. Primary Research Interview List

	NAME	ROLE	ORGNIZATION	INTERVIEW CATEGORY
1	Anonymous	n/a	Chicago Infrastructure Trust	Alternate Model
2	Johnathan Trutt	Executive Director	West Coast Infrastructure Exchange	Alternate Model
3	Scott Boardman	Associate Director	West Coast Infrastructure Exchange	Alternate Model
4	Bryan Garcia	President & CEO	CT Green Bank	Alternate Model
5	Jeremy Burke	Director of Strategy	UK Green Bank	Alternate Model
6	Alfred Griffin	President & CEO	NY Green Bank	Alternate Model
7	Jeff Diehl	Executive Director	RI Infrastructure Bank	Alternate Model
8	Mike Baer	Senior Advisor	RI Infrastructure Bank	Alternate Model
9	Michael P. Laroque	Deputy Director	RI Infrastructure Bank	Alternate Model
10	Divvya Shah	SVP Transportation Finance	Infrastructure Ontario	Alternate Model
11	Saad Rahali	Director Project Finance	Infrastructure ONtario	Alternate Model
12	Giridhar Srinavasan	Infrastructure Investment Professional	International Finance Corporation	Alternate Model
13	Teveia Barnes	Executive Director	CA iBank	Alternate Model
14	Nancee Tromblee	Chief Operating Officer	CA iBank	Alternate Model
15	Josh Schank	Director	Metro OEI	Alternate Model
16	Marla Westervelt	Senior Transportation Planner	Metro OEI	Alternate Model
17	Eugene Zhuchenko	Executive Director	Long-Term Infrastructure Investors Association	Financial Partner
18	Jeffrey Parker	Founder & CEO	Parker Infrastructure Partners	Financial Partner
19	Giles Bicknell	Investment Executive	InfraRed Infrastructure Partners	Financial Partner
20	Gregory Smith	President and CEO	InfraAFG	Financial Partner

21	Corey McCollough	UCLA Anderson (former Vice President)	Montague DeRose and Associates	Financial Partner
22	Jared Griffith	UCLA Anderson (former Public Finance Investment Banking Associate)	Bank of America Merryll Lynch	Financial Partner
23	Alan Smith	UCLA Anderson (former Analyst III)	Loop Capital Markets	Financial Partner
24	Neal Chhabra	Merger's & Acquisitions Analyst	Morgan Stanley	Financial Partner
25	Leisel Moorhead	Partner	QIC	Financial Partner
26	Chris Connolly	Investment Banking Analyst	Morgan Stanley/Office of Rep. Nancy Pelosi	Financial Partner
27	Anonymous	n/a	n/a	Financial Partner
28	Anonymous	n/a	n/a	Financial Partner
29	Anonymous	n/a	n/a	Financial Partner
30	Juan Matute	Associate Director	Lewis Center, UCLA Luskin	Policy Partner
31	Michael Sheldon	Business Development Manager	InfraDeals	Policy Partner
32	Julie Kim	Professor	Stanford	Policy Partner
33	Neil Walmsley	Creditworthiness Network Manager	C40	Policy Partner
34	Chris Margonis	President	InfraAssociates	Policy Partner
35	Greg Barrow	Senior Associate	InfraAssociates	Policy Partner
36	Emily Han	Policy Analyst	Eno Center for Transportation	Policy Partner
37	Paul Lewis	Vice President of Policy & Finance	Eno Center for Transportation	Policy Partner
38	Alex Bond	Director, Center for Transportation Leadership	Eno Center for Transportation	Policy Partner
39	Steve Polechronis	Senior Vice President	AECOM	Policy Partner
40	Tanner Osmon	Professor	UCLA	Policy Partner

C. California Transportation P3 Project Data

Transaction Name	Type	Payment Mechanism	Delivery Model	Sub-Sector	Grantors	Transaction Date
Dana Point Harbor Revitalization P3	Greenfield		DBFOM	Ports	Orange County, California	2016
West Santa Ana Branch LRT	Greenfield			Light Rail	Los Angeles County Metro Transit Authority (LACMTA)	2016
High-Speed Rail P3	Greenfield		DBFOM	Rail	Federal Railroad Administration	2016
San Diego Federal Inspection Facility	Greenfield		DBF	Airports	San Diego Regional Airport Authority	2016
San Diego Airport Terminal 1 Redevelopment	Greenfield			Airports	San Diego Regional Airport Authority	2016
LAX Automated People Mover (APM) P3	Greenfield	Availability-Based	DBFOM	Airports	Los Angeles World Airports (LAWA)	2016
LAX Consolidated Rent-A-Car (ConRAC) P3	Greenfield	Availability-Based	DBFOM	Car Parks	Los Angeles World Airports (LAWA)	2016
San Diego Airport Cargo Facilities P3	Greenfield		DBFO	Airports	San Diego Regional Airport Authority	2016
Highway 37 Improvements	Greenfield			Roads		2015

Presidio Parkway Doyle Drive Concession	Greenfield	Availability-Based	DBFOM	Roads	California Department of Transportation (Caltrans),San Francisco County Transportation Authority	2012
SR 125 South Highway	Greenfield	Revenue or Demand Risk	DBFOM	Roads	California Department of Transportation (Caltrans),San Diego Association of Governments (SANDAG)	2003
91 Express Lanes - California	Greenfield	Revenue or Demand Risk		Roads	California Department of Transportation (Caltrans)	1993

D. California Legislation on P3s

State	Statute	Provisions	Legislative Approval Required
California	Cal. Streets & Highways Code §143	Comprehensive statute that authorizes PPPs for transportation projects. Under legislation enacted in 2009 (Senate Bill 4b; 2009 Cal. Stats., Chap. 2), allows the state DOT (Caltrans) and regional transportation agencies, if authorized by the California Transportation Commission, to enter into "comprehensive development lease agreements" with public and/or private entities for transportation projects, including those that charge tolls or fees. Eliminates the need for legislative approval of lease agreements. Establishes the Public Infrastructure Advisory Commission as a public PPP advisory body. Prohibits noncompete clauses. Allows for solicited and unsolicited proposals. No lease agreements may be entered into under this section on or after Jan. 1, 2017.	No. The 2009 legislation eliminated former legislative approval requirements, which had been in place since 2005. However, the new law provides that lease agreements must first be submitted to the California Transportation Commission for approval, then to the Legislature and the Public Infrastructure Advisory Commission for review (Cal. Streets & Highways Code §143(c)(2) and §143(c)(5)).
	Cal. Gov. Code §§5956 to 5956.10	Authorizes local governmental agencies to enter into agreements with private entities to study, plan, design, construct, develop, finance, maintain, rebuild, improve, repair and/or operate a variety of fee-producing infrastructure facilities, including rail, highway, bridge, tunnel or airport projects. Allows for solicited and unsolicited proposals. Prohibits using the authority in this section to design, construct, finance or operate a toll road on a state highway.	No. However, any action by a local agency to levy a new fee or service charge or to approve an increase in an existing fee or service charge pursuant to this chapter shall be taken only by ordinance or resolution of the legislative body of that agency (Cal. Gov. Code §5956.10(b)(5)(D)).

E. Survey Questionnaires

Alternative Model Survey

P3 Infrastructure Trust Alternative Model Pre - Interview Survey:

1. **Interview Name: _____**
2. **Interviewee Company Name: _____**
3. **HQ Location/Geographic Focus: _____**
4. **Date Organization Established: _____**
5. **Legal Status: _____**
6. **Estimated Organization Size (# of employees total): _____**
7. **Number of projects completed (financial close or in process of financial close):**

_____

8. **Interviewee Title: _____**
9. **Duration in current role: _____**
10. **Other relevant previous experiences (please provide brief description/title of organization if applicable):**

_____

11. **Which best describes your (or your organizations role) in the US P3 infrastructure industry?**

a. Public stakeholder /Government Sponsor (including public sector contracted advisors*).

b. Private capital investor.

c. Industry partner (e.g. private developer, contractor selected by P3 stakeholders)

d. Other. Please provide brief description of organization/function _____

12. **As a business professional (acting as an individual or as part of a organization) I have been previously involved in _____ P3 infrastructure development transactions (in pipeline and those that have reached financial close):**

    1. Never participated in completing a P3 infrastructure development deal in any capacity.
    2. > 5 (1- 4) deals.
    3. 5-10 deals.
    4. > 10 deals.

13. **I have historically participated in P3 deals with public agency sponsorship at the _____ level**:

    1. Local e.g. municipal, gubernatorial
    2. State
    3. Regional

4. Federal
5. Other (please explain briefly) _____

14. The average ticket size of previously executed deals I have participated in was:

1. $1M-$100M
2. $100M-$500M
3. $500M -$1B
4. $1B+

15. The average length of the total contracted period (build + maintenance) for deals I have been participated in was:

1. 0-15 years
2. 15-50 years
3. 50-75 years
4. 75+ years

16. Previous P3 concession agreements I have been involved in were primarily concentrated in the _____ sector?

a. Transportation (e.g. bridges and tunnels, railways, roads and streetlights)

b. Education (state campus improvement)

c. Energy

d. Telecommunications

e. Social Infrastructure (civic centers, other public accommodations)

17. Please rank selection criteria below from most important (1) to least importance (4): Criteria I deem most influential when considering viability of a potential P3 concession agreement is:

a. _____ Project size.

b. _____ Project complexity.

c. _____ Public support.

d. _____ Relationship to revenue sources.

18. What do you view as the greatest benefits/advantages for public agencies entering into P3 concessions? Please rank criteria below from most important (1) to least important (5):

a. _____ increased up-front financing through private equity.

b. _____ Make greater total debt capacity available through private structure that enables completion of larger more complex projects.

c. _____ Share revenue and risks with private sector.

d. _____ Incentives created by private capital financing structure and lead to better asset management and on-time and on-budget project delivery

e. _____ Greater access to land and infill sites not otherwise available to private entities alone

19. Which of the following is your preferred contract structure when entering into a P3 concession agreement?

a. Availability/Milestone payments

b. Revenue sharing/demand risk

c. Minimum guarantee.

d. Pay for performance contract.

e. All of the above. Preferred structure determined on a project-by-project basis.

20. What do you see as the biggest challenge for P3 project development in the United States? Please rank criteria below from most significant challenge (1) to least significant challenge (5):

a. _____ Political. Lack of P3 enabling legislation is biggest challenge for entering into concession agreements currently

b. _____ Lack of qualifying projects, e.g. scale/revenue generating that would attract private capital.

c. _____ Lack of public support (e.g. misconception of 'privatizing assets')

d. _____ Lack of organizational capacity. Public sponsors interested but lack resources to develop P3 entity to consult on P3 development.

e. _____ Other. Please briefly explain.

21. What have you found to be the largest, if any, impediment to attracting private capital for P3 concessions? Please rank criteria below from most significant (1) to least significant (4):

a. _____ Political Risk: regulatory delays/loss of right to develop if project champion leaves office etc.

b. _____Unfair Risk Allocation: excessive cost of development/profitability/length of contract/valuation of risk

c. _____ Lack of cognizable process. Limited predictable structure and measure of transparency given current regulatory environment for P3 project development varying by state/municipality/region.

d. _____ Deal Terms: e.g. preference to work as partners in venture, fixed fee contract etc.

22. Assuming a project has been deemed both fiscally viable for both the short and long term, with IRR for private entities above investment threshold. What next factors do you <u>most</u> consider relevant when deciding whether to bid on a P3 contract or get involved in a P3 infrastructure project? Please rank criteria below from most significant (1) to least significant (4):

a. _____ Length of debt and public entity's ability to service debt in future.

b. _____ Relationship of the project to the revenue stream. How reliable are the expected project revenues (if anticipated to be servicing debt in future).

c. _____ Public preferences and existing policies.

d. _____ Other external factors.

Financial Partner Survey

P3 Infrastructure Trust Private Capital Pre - Interview Survey:

1. **Interview Name: _____**
2. **Interviewee Firm Name: _____**
3. **HQ Location/Geographic concentration (if applicable): _____**
4. **Date entity Established: _____**
5. **Legal Status: _____**
6. **Estimated Organization Size (# of employees total): _____**
7. **Total AUM: _____**
8. **Infrastructure fund size: _____**
9. **Avg./standard investment return threshold for infrastructure assets _____**
10. **Interviewee Title: _____**
11. **Duration in current role: _____**
12. **Other relevant previous experiences (please provide brief description/title of organization if applicable):**

_____

11. Which best describes your (or your firm's role) in the US P3 infrastructure industry?

a. **Public stakeholder /Government Sponsor** (including public sector contracted advisors*)..

b. **Private capital investor** (equity or debt capital);.

c. **Industry partner** (e.g. private developer, contractor selected by P3 stakeholders)

d. Other. Please provide brief description of organization/function _____

12. As an institutional investor (acting as a representative for your firm or organization) I have been previously involved in _____ domestic P3 infrastructure development transactions (in pipeline and those that have reached financial close):

a. Never participated in completing a P3 infrastructure development deal in any capacity.

b. > 5 (1- 4) deals.

c. 5-10 deals.

d. > 10 deals.

13. I have historically participated in P3 deals with the public agency sponsorship at the _____ level:

a. **Local** e.g. municipal, gubernatorial

b. State

c. Regional

d. Federal

e. Other (please explain briefly) _____

14. The average ticket size of previously executed deals I have participated in was:

a. $1M-$100M

b. $100M-$500M

c. $500M -$1B

d. $! B+

15. The average length of the total contracted period (build + maintenance) for deals I have been participated in was:

a. 0-15 years

b. 15-50 years

c. 50-75 years

d. 75+ years

16. As an institutional investor, previous deals I have participated in were concentrated on _____ infrastructure asset investments.

a. **Regulated assets** (including electricity transmission lines, gas and oil pipelines, water distribution systems, and wastewater collection and processing systems).

b. **Transportation assets** (including toll roads, bridges, tunnels, railroads, rapid transit links, seaports and airport).

c. **Communication assets**, including radio and television broadcast towers, wireless communication towers, cable systems and satellite networks.

d. **Social infrastructure assets**, including schools, hospitals, prisons and courthouses.

f. Projects invested in are generally **sector agnostic;** most influential criteria in determining project scope is relationship to revenue sources.

17. Please rank selection criteria below from most important (1) to least importance (4): criteria I deem most influential when considering viability of a potential P3 concession agreement is:

a. _____ Project size.

b. _____ Project complexity.

c. _____ Public support.

d. _____ Relationship to revenue sources/structure of returns (cash yield, leveraged IRR, capital appreciation potential).

e. _____ Project length- long term investor (e.g. pension funds) looking for avg life of investment opportunity 25-75 years.

18. What do you view as the greatest benefits for institutional investors considering infrastructure asset investments? Please rank criteria below from most important (1) to least important (5):

a. _____ **Stable cash and economic insensitivity/inelastic demand** (e.g. most infrastructure assets have monopolistic positions in and provide essential function to market they serve).

b. _____ **Portfolio diversification**. Diversified asset class with low correlation to other asset classes and wide end-user base; government relationship generally enhances credit worthiness, reduces risk.

d. _____ **Long-term returns**. Length of concession agreements associated with infrastructure asset investments provide fixed returns over long-term period. MOST attractive

e. _____ **Inflation protection.** Rates charged by infrastructure assets are determined by regulators, concession agreements with governments and long-term contracts; asset-owners generally have ability to increase rates at some level linked to inflation and/or the economy over time.

19. Which of the following is your preferred contract structure when considering a P3 concession investment?

a. Availability/Milestone payments

b. Revenue sharing/demand risk

c. Minimum guarantee.

d. Pay for performance contract.

e. All of the above. Preferred structure determined on a project-by-project basis.

20. What do you see as the key risks for investors considering investment opportunities in P3 project development in the United States? Please rank criteria below from most significant challenge (1) to least significant challenge (5):

a. _____ **Political and regulatory framework.** Inconsistent/uncertain regulatory framework and political instability makes risk associated with projects outweigh benefits of potential IRR.

b. _____ **Project sub-sector.** Each infrastructure sub-sector has different risk factors, expected returns and economic sensitivities that are most influential in determining project investment.

c. _____ **Stage of development.** Brownfield vs. greenfield asset class preference (based on level of risk, $$)

d. _____ **Liquidity.** Due to size/complexity of some assets limited # of potential buyers and regulatory approval requirements, divestment of infrastructure assets can take a significant amount of time and effort.

e._____ **Emerging asset class.** P3/private capital infrastructure investments relatively new asset class, thus no real reliable return data comparable to other asset classes which makes it difficult to model in an asset allocation.

f. _____**Unfair Risk Allocation**: excessive cost of development/profitability/length of contract/valuation of risk.

g. _____ **Lack of cognizable process**. Limited predictable structure and measure of transparency given current regulatory environment for P3 project development varying by state/municipality/region.

h. _____ Deal Terms: e.g. preference to work as partners in venture, fixed fee contract etc.

21. Assuming a project has been deemed both fiscally viable for both the short and long term, with IRR for private entities above investment threshold. What next factors do you <u>most</u> consider relevant when deciding whether to bid on a P3 contract or get involved in a P3 infrastructure project? Please rank criteria below from most significant (1) to least significant (4):

a. _____ Length of debt and public entity's ability to service debt in future.

b. _____ Relationship of the project to the revenue stream. How reliable are the expected project revenues (if anticipated to be servicing debt in future).

c. _____ Public preferences and existing policies.

d. _____ Other external factors.

F. Industry Benchmarking for Alternative Models

	Interational Finance Corporation	West Coast Infrasstructure Exchange	NY Green Bank	Chicago Infrastructure Trust
Organizational Structure	**IFC**	**WCX**	**NY**	**CIT**
Currently Active:	✓	✓	✓	✓
Infrastructure Delivery Stakeholder Category	Other. Private Arm World Bank	Govn't Sponsor	Govn't Sponsor	Govn't Sponsor
Relationship to Public Sector	Private	Quasi-Public	Quasi-Public	Quasi-Public
Legal Status (Charter)	Int'l Finance Inst.	Non-Profit; 501('c')(3)	Specalized Financial Entity	Non-Profit; 501('c')(3)
Estimated Org Size	200	2	20	12
Years Active in P3 infrastructure?	21	2.5	3	5
Geographic Scope/Jurisdiction	Global; Emerging Markets	Regional; BC, CA & Oregon	State	Sub-state (City)
Core Competence/ Function in Project Delivery:	Financing	Delivery	Financing	Delivery
Annual Operating Budget		$750K	$5.538M	
Budgeted Funds Appropriated by:	Debt Issuance (Multiple)	Grant Funding (Seed Capital)	State Funded	City Council; 3rd Party Investors
Org Features Relating to P3 Delivery Method:	**IFC**	**WCX**	**NY**	**CIT**
Involved w P3 delivery for >1	✓	✗	✗	✓
Jurisdiction enacted P3 Legislation?	N/A			
Specially Purposed Vehicle for P3 oversight?	✗	✓	✗	✓
Also Facilitate trad'l delivery ?		✗	✓	✓
# of P3 Transactions Closed:				3
Total Cumulative $ of P3 Transactions Closed			$304.7M	49.2M
# potential deals active (open for bid)				3

Primary Capital Market Participants/Source of Capital Funding:	Debt Issuance (Multiple)	Public Pension Funds	State Funded - User Fees	Public & Private Pension; Mutual; Sovereign Wealth Funds
Fund Size (i*f applicable*)				
Org has Dedicated Capitalization Source?	✗	✓	✓	✗
Primary Sector(s) Focus:	**IFC**	**WCX**	**NY**	**CIT**
Water & Municipal Infrastructure (Regulated Assets*)	✓	✓		
Energy			✓	✓
Transportation Assets	✓	✓		
Social Infrastructure				
Communication Assets				
Agnostic - All Sectors Considered ;Project - by - Project Determination				
Org.Stated Strategic Goals for Infrastructure Financing:	**IFC**	**WCX**	**NY**	**CIT**
Streamlining/Standardization of Process		✓		
Innovation in Project Delivery & Financing	✓	✓		✓
Strategic Planning/Advisory/Best Practice	✓	✓		✓
Public Education & Outreach		✓		
Provide Affordable Infra Financing Options	✓			
Cost Efficiencies: Project Aggregation, Economies of Scale, Efficient Management		✓	✓	✓
Technical, Legal, Financial Expertise	✓	✓		✓
Accelerate Private Investment			✓	✓

(Industry Benchmarking for Alternative Models, continued…)

Connecticut Green Bank	United Kingdom Green Bank	Rhode Island Infrastructure Bank	California Infrastructure Bank	Infrastructure Ontario
CT	**UKGIB**	**RIB**	**CA**	**IO**
✓	✓	✓	✓	✓
Govn't Sponsor	Other: For-profit investor owned by Govn't	Govn't Sponsor	Govn't Sponsor	Govn't Sponsor
Quasi-Public	Quasi-Public	Quasi-Public	Quasi-Public	Public
	Joint Venture	Public Agency	Economic Development Bank	Crown Agency
48	130	10		500
6	5	28	✕	
State	Multi-National	State	State	Provincial (State)
Financing	Financing	Financing	Financing	Delivery (Procurement)
$31.473M		$3.5M		
State & Federal Funding - User Fees		Self-Sustaining		State Funded
CT	**UKGIB**	**RIB**	**CA**	**IO**
✓	✕	✓	✕	✓
		✕	✓	✓
✓	✕	✕	✕	✓
✓	✓	✓	✓	✓
82,271			✕	

			None. $37B in financing debt	
Equity, Tax Equity Local, State & Regional Credit Unions & banks	Debt Issuance	Fed & State Grant; Public Bond Mrkt; Private Capital	Debt Issuance (Revenue Bonds Only*)	Federal & Provincial Treasury Board Allocation
$915.9M		<$50M	$425M	
✓	✓	No. Leverage Public Bond Market	✓	✓
CT	**UKGIB**	**RIB**	**CA**	**IO**
		✓	✓	✓
✓	✓	✓	✓	✓
			✓	✓
			✓	✓
			✓	✓
			✓	✓
CT	**UKGIB**	**RIB**	**CA**	**IO**
	✓		✓	✓
✓				✓
			✓	
✓				

G. Industry Benchmarking for State P3 Agencies

	Virginia Office of Transportation Public Private Partnerships	Texas Department of Transportation	Washington Transportation Partnerships Office	Florida Partnership for Public Facilities and Infrastructure Act Guidelines Taskforce	Michigan Office for Public Private Partnerships
	OTP3	**TxDOT**	**WA**	**FL**	**MI**
Authority & Governance:					
P3 Enabling Legislation Enacted/ Unit Created	1995/2010		1991/2006	2013	2008
Stakeholder Category	State Sponsor	State Sponsor	State Sponsor	State Sponsor	State Sponsor
Primary Function:	P3 Recommendation & Execution	P3 Implementation & Execution	P3 Implementation & Execution	P3 Implementation & Execution	
Sector-Focused?	Multi-Modal Transportation	Roads, Highways & Rails only	Multi-Modal Transportation	Multi-Modal Transportation	
Dedicated P3 Unit?	✓	Division of DOT	No. Public Private Initiatives in Transportation (PPI) within DOT	No. Project Finance Division of DOT	✓
Location Within Government:	State DOT	State DOT	State DOT	Office of Comptroller General	Treasury Department
Reporting Requirements:	OTP3	State DOT	State DOT		
Approval Requirements:	PPTA Steering Committee;	Texas Transportation Commission (TTC)	WS Transportation Commission	Pre-Bid: Gov & Leg; Concession Agreement: AG	

Established Policies/Procedures:	PPTA Implementation Manual & Guidelines	✕	✕	✕	
Authorizing Statute Guidance?	N/A	✓		✓	
Annual Operating Budget:					
Operating Budgeted Funded By:	State	State & Federal	State DOT	State only for State Highways;	Self-sustaining; closing costs include deal transaction
Full Time or Part Time Staff?	Full Time	N/A		Full Time Program Manager for P3	
Estimated Org Size	9				
Operating Budget					
Use of Outside Consultants?	✓	✓		✓	
Financial	✓	✓		✓	
Technical	✓	✓		✓	
Legal	✓	✓		✓	
Accept Unsolicited Proposals:	✓	✓		✓	
Proposal Review Fee:	$50K	$50K		$50K	

VIII. Full Bibliography

Aziz, Ahemd M. Abdel, "Successful Delivery of Public-Private Partnerships for Infrastructure Development", *Journal of Construction Engineering and Management*, December 2007.

Bryan Garcia, Phone Interview with *CT Green Bank, President & CEO,* November 20, 2016.

Bryan Gibson, Candice Wallace and Roy Sturgil, "Synthesis of Public-Private Partnerships: Potential Issues and Best Practice for Program and Project Implementation and Administration", *Kentucky Transportation Center: College of Engineering Report*, August 2015.

California Forward, "Financing the Future: How Will California Pay for Tomorrow?" Chapter 2, *in partnership with the California Economic Summit*, February 2015

Divya Shah and Saad Rahali, Phone Interview with Infrastructure Ontario, *SVP Transportation of Finance & Director Project Finance,* January 10, 2017.

Ellen Hanak and Davin Reed, "Paying for Infrastructure: California's Choices," *At Issue, Public Policy Institute of California,* January 2009.

Grindhar Srinivasan, Shuvan Dutta, Victor Kats and Kristine Damkjer, Phone Interview with *International Finance Corporation*, January 23, 2017.

Jeremy Burke, Phone Interview with *UK Green Bank, Director of Strategy*, December 2, 2016.

Jonathan Trutt and Scott Boardman, Phone Interview with West Coast Infrastructure Exchange, *Executive Director & Associate Director,* November 2, 2016.

Kevin Dayton, Jill Eicher, Marc Joffee and Ed Ring, "Rebuilding California's Infrastructure for the 21st Century: A Survey of Next Generation Infrastructure Options and New Financing Models", *California Policy Center,* December 2016.

Martin, Brandon, "Just the Facts, California's State Budget: The Governor's Proposal", *Public Policy Institute of California*, February 2017.

Merz, Jeremy. "Transportation Infrastructure Funding: New Financing Options for a Changing Economy", *Cal-Chamber Business Issues* 2016.

Nicole DuPuis and Christina K. McFarland, "Paying for Local Infrastructure in a New Era of Federalism: A State-by-State Analysis" *National League of Cities: Center for City Solutions and Applied Research*, December 2016.

Reinhardt, William, "The Role of Private Investment in Meeting U.S. Transportation Infrastructure Needs", *Transportation Development Foundation*, May 2011

Robert Puentes and Patrick Sabol, "Building Better Infrastructure with Better Bonds", *The Brooking Institute, Series: Metropolitan Infrastructure Initiative*, April, 22, 2015.

Taylor, Mac, "The 2016-17 Budget: California Spending Plan", *Legislative Analyst Office (LAO) Report*, October 2016.

The White House, Office of the Press Secretary, "Fact Sheet: Increasing Investment in U.S. Roads, Ports and Drinking Water Systems Through Innovative Financing", January 16, 2015.

Trotter, Joe, "California: Governor Proposes Enormous Increase in Gas Tax and Registration Fees", *Stonegait Institute*, January 19, 2017.