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Public-Private Partnerships in California

How Governments Can Innovate, Attract Investment, and Improve Infrastructure Performance

BAY AREA COUNCIL ECONOMIC INSTITUTE

Acknowledgments

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Public-Private Partnerships in California

How Governments Can Innovate, Attract Investment, and Improve Infrastructure Performance

Presidio Parkway

Executive Summary

California's vibrant economy and communities rely on an extensive infrastructure network of highways, bridges, ports, levees, rail lines, public buildings, and energy, water, and wastewater systems. Over the past several decades, much of the state's infrastructure has been inadequately maintained and is facing a backlog of deferred maintenance, even as new needs arise. Funding has not kept pace with aging infrastructure or the demands of a growing economy and population. On the current spending trajectory, California's infrastructure funding gap will reach $1 trillion by 2050. Investment in infrastructure has one of the highest economic multipliers of any form of government spending, but due to California's failure to invest in and maintain its infrastructure at all levels, the state is putting its future growth and prosperity at risk.

While positive steps have been taken in recent years, business as usual is not delivering the infrastructure that California needs to support economic and population growth in the decades ahead. In too many cases, public agencies spend millions of dollars studying projects for years or decades, making little progress toward actual delivery, even as delay sends costs through the roof. When projects are built, frequent cost and schedule overruns—typically 10–20%, but at times over 100%—and subsequent failure to maintain assets over time result in higher costs and a lower quality of services for the public. The need to improve on this sub-optimal status quo will become more urgent as climate change places additional strain on existing infrastructure and requires new investments to address rising sea levels and shifting weather patterns.

There is a demonstrated need to fundamentally reform public infrastructure procurement in California and the U.S., accelerate project delivery, and drive more widespread adoption of life-cycle management approaches. Public agencies across the state have begun looking to public-private partnerships (P3s) as a tool that achieves these goals by shifting the risk for delivery and long-term management of infrastructure assets to private partners. The role these partnerships can play in addressing California's infrastructure needs is the primary focus of this report.

Definitions of P3 vary widely, but most commonly refer to long-term (typically 25+ years) performance-based contracts with public-sector entities in which the private sector takes or shares responsibility and risk for the design-build-finance-operate-maintain (DBFOM) elements of a public infrastructure project. P3s are not appropriate for every project and will not by themselves solve the state's infrastructure funding challenges, but properly-structured P3s have a demonstrated track record of reducing the risk of cost overruns, accelerating project delivery, and providing contractual guarantees for proper operations and maintenance over the life of a public asset.

Public-private partnerships have played a modest but important and growing role in infrastructure delivery in California to date. California was one of the first states to adopt P3 legislation and has been home to some of the country's most innovative projects. This report highlights seven of the most high-profile projects in the state over the past five years, primarily in water and social infrastructure. Public agencies in the state can look to these experiences and a substantial body of global literature to understand both the limitations and the substantial potential of P3s to deliver value to the public through improved cost and operational performance.

California is also developing a significant pipeline of P3 projects in the years ahead. This report identifies 23 projects that are in active procurement or in the planning stages across a range of sectors, as well as longer-term, large-scale projects that lend themselves to consideration as P3 procurements.

Despite this growing pipeline and its demonstrated benefits, the use of P3s is much less widespread than it could be. The lessons from the past five years of experience in California and elsewhere suggest the following best practices and innovations.

P3 Offices and Programs: Rather than considering just one-off projects, public agencies can develop broader P3 initiatives to build procurement expertise and consequentially larger, more impactful pipelines.

Progressive P3: The number of progressive P3s in California is growing. In a progressive delivery procurement, the private partner is selected early in

the process, based on qualifications, and develops the contract and ongoing design collaboratively with the public partner so as to maximize public input and opportunity for innovation.

Unsolicited Proposals: Public agencies such as LA Metro are accepting unsolicited project proposals, increasing the number and diversity of P3 projects that are considered and incorporating technology solutions that agencies are not well placed to consider in their traditional project development processes.

Public Sector Leadership: Projects benefit when public agencies recognize the importance of having a political champion and dedicated staff that can advance P3 projects through the inevitable political, financial, and technical challenges. This is critical to fostering the needed internal cultural changes when adopting a new form of procurement. Access to transaction-oriented advisors with a track record of bringing P3 projects to close is also important.

Stakeholder Engagement: Early engagement of the public, decision makers, and the labor community, among others, is important to identifying and proactively addressing challenges that could stall a project during the procurement or delivery phase.

Policy changes at the state and federal levels can incentivize project delivery and life-cycle asset management. Adopting these changes does not mean that every capital project in the state will be delivered as a P3. Such changes would, however, provide public agencies with additional tools that may allow them to deliver major projects in a manner that is more cost-effective for the public.

State-Level Authorizing Legislation: Currently Caltrans and regional transportation agencies do not have the authority to enter into P3 contracts for road and highway projects. (That authority expired in 2017.) A permanent extension of P3 authority for all transportation projects would give California's public agencies additional flexibility for meeting the state's growing transportation needs.

State-Level CEQA Reform: CEQA plays a vital role in protecting California's environment. It has also become an obstacle to delivering infrastructure in a timely and cost-effective manner under any procurement approach. Reforms that limit legal challenges and accelerate agreed categories of projects with minimal environmental impacts could help the state reduce costs and uncertainty.

State-Level Public Resources: The state could provide expertise and limited financial assistance to public agencies in order to build their capacity in P3 procurement. A California center of excellence could provide standardized procurement documents, skills transfer, and vetting of third party advisors as a way to accelerate procurement and provide public sector agencies with greater comfort in utilizing a new delivery model. Limited predevelopment funding would help public agencies accelerate the earliest, highest-risk phases of projects. The state could also require that life-cycle costs and performance in the project design, operations, and selection of procurement approach must be considered for any project over a certain size that receives state funding.

Federal-Level Tax-Exempt Financing: There is a need to level the playing field on the cost of capital for P3 projects. While there are currently federal programs that provide low-cost capital to P3 projects, they apply only to certain types of projects or have limited capacity. Ensuring that all public infrastructure projects have access to tax-exempt financing, regardless of how they are delivered, would provide public agencies with greater flexibility. Congress could do this by removing the volume cap on private activity bonds (PABs), eliminating the Alternative Minimum Tax penalty, expanding the types of projects eligible for PABs (as proposed in the Public Buildings Renewal Act of 2017, H.R. 960/S. 326—which would enable tax-exempt finance for public-private partnerships used to develop public buildings), and providing additional options for addressing existing tax-exempt debt.

Federal-Level Flexibility and Incentives: New federal grant programs and incentives could encourage state and local agencies to accelerate needed infrastructure projects. This could take the form of the Trump Administration's proposed Infrastructure Incentives Program, which would provide grant assistance to selected projects, or another proposal in the Administration's infrastructure plan which would streamline review for projects that do not rely significantly on federal funding.

Introduction

California is home to some of the nation's most iconic and ambitious infrastructure, from the Golden Gate Bridge to the State Water Project. With an extensive network of highways, bridges, ports, levees, rail lines, public buildings, and energy, water, and wastewater systems, the state needs large-scale investments in its infrastructure to address deferred maintenance, serve a growing population, and adapt to a changing climate. This introduction first examines the state of California's infrastructure and funding needs in the coming decades. It then discusses the role that innovative procurement and financing strategies such as public private-partnerships (P3s) can play in addressing these needs. It also considers the role that P3s have played historically in California and around the world, before moving to case studies of recent projects in Chapter 1.

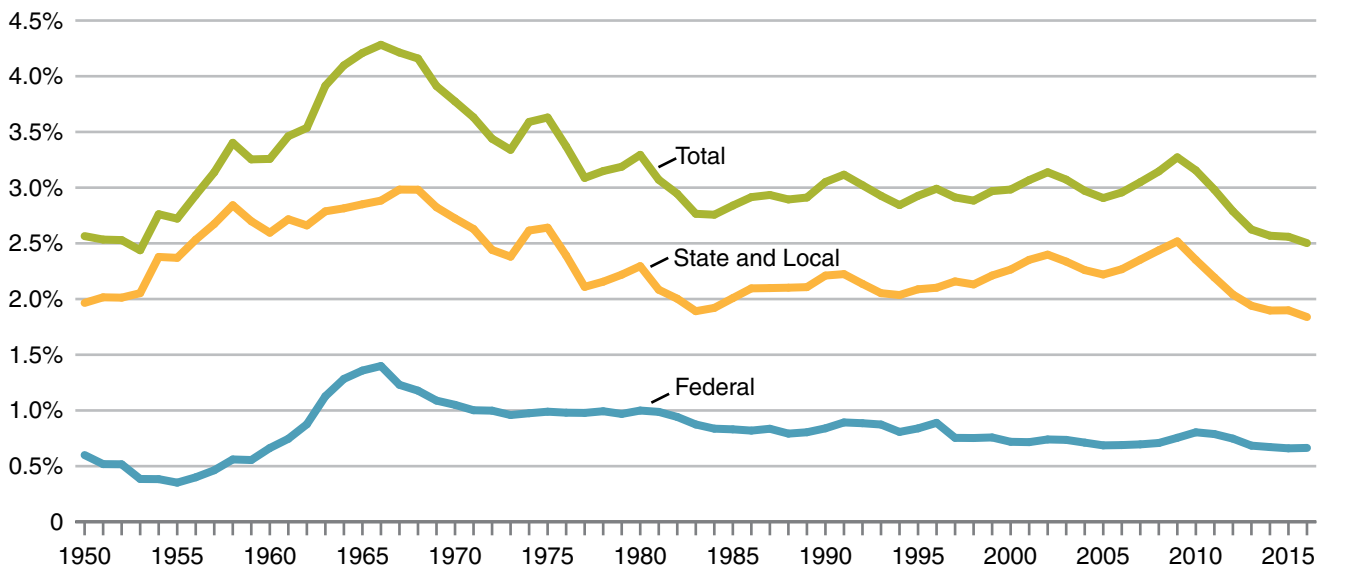
Infrastructure Investment Status

Infrastructure at both the state and local levels—in California and across the U.S.—is in increasingly poor condition as funding levels continue to fall short of needs. State and local governments own over 90% of the country's non-defense public infrastructure.[1] The federal government plays an important role in funding infrastructure at all levels of government, but total federal capital investment has declined sharply in the past 50 years—from 1.4% of GDP to under 0.7% of GDP. Failing to fill the gap, state and local spending has also declined relative to GDP over that same time period.[2]

Figure 1

Government investment in public infrastructure has declined over the past 50 years.

Government Nondefense Investment in Public Fixed Assets, 1950–2016, as a Share of GDP

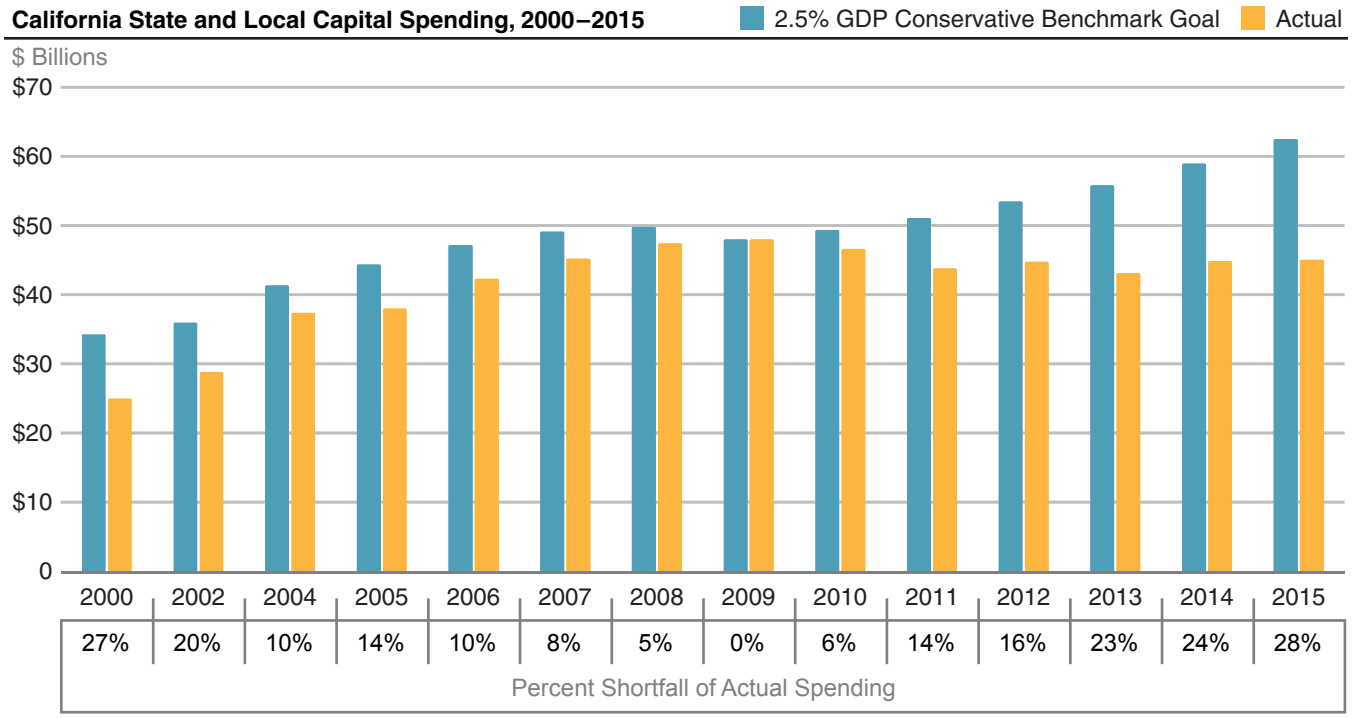


Source: Bureau of Economic Analysis

Analysis: Bay Area Council Economic Institute

FIGURE 2

Using a modest benchmark of 2.5% of GDP as an investment goal, California's capital spending has fallen short since 2000.



Source: U.S. Census, Bureau of Economic Analysis

Analysis: Bay Area Council Economic Institute

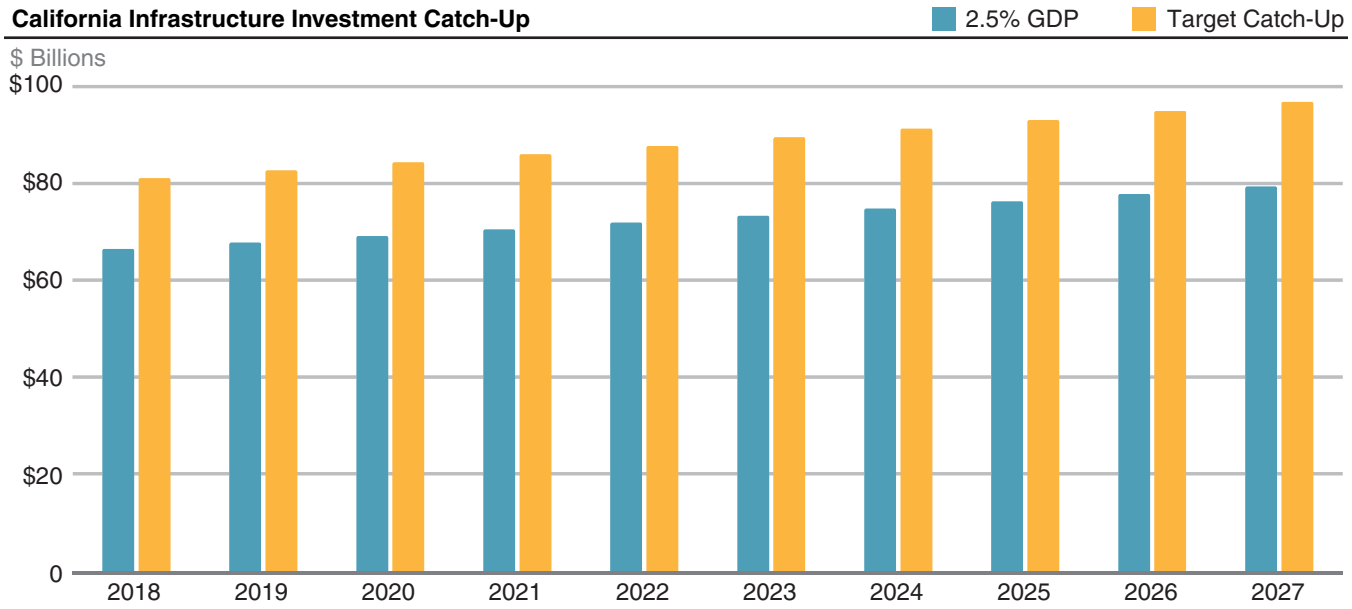
The result of lower spending is a broad decline in the condition of infrastructure across the nation. The American Society of Civil Engineers gives America's infrastructure a grade of D+.[3] There is a broad-based need to repair aging water and wastewater systems, replace structurally deficient dams and bridges, rebuild deteriorating roads, and invest in new transit, school, water, and energy projects. These investments are critical to future growth, as infrastructure spending has one of the highest economic multiplier effects of any public investment.[4] These spending trends, the deteriorating condition of the nation's capital stock, and the potential for economic growth that comes with greater investment all suggest that a higher level of investment in infrastructure is needed now.

In California, infrastructure spending patterns and the condition of infrastructure assets mirror national trends. Nearly 50% of the state's public roads are in poor condition, which costs each motorist $844 on average in annual vehicle repair costs caused by the lack of road upkeep.[5] Nearly 1,400 bridges in the state are structurally deficient. California's school facilities are underfunded by $6.7 billion per year.[6] The state's parks, dams, levees, public buildings, and water and wastewater systems all have significant unmet funding needs. The 2018 California Infrastructure Plan identifies $67 billion in deferred maintenance for state infrastructure alone.[7]

There is no single agreed-upon target for adequate infrastructure investment. In the U.S., public capital investment across all levels of government has averaged 3% of GDP since 1950 but has declined to 2.5% of GDP in recent years.[8] Spending levels have been higher across other developed economies, averaging 3.7% of GDP.[9] Current levels of investment will come under further pressure from the high level of deferred maintenance across infrastructure assets in California and the future need to adapt many of those assets and develop new responses to the impacts of climate change. Using even the 2.5% of GDP benchmark as a

Figure 3

In the next decade, California would need to spend nearly $900 billion or 3.05% of the state's GDP per year in order to make up the past 10 years' shortfall.



Source: U.S. Census, Bureau of Economic Analysis

Analysis: Bay Area Council Economic Institute

conservative investment target, Figure 2 shows how California's spending since 2000 has fallen short. The gap averages 15% of actual spending, with a cumulative total of $100 billion over the past 15 years.

Looking forward, if California were to make up the past 10 years' funding shortfall in the next decade, state and local governments would need to spend nearly $900 billion or 3.05% of the state's GDP per year. The implications are clear: as capital spending is deferred, the amount of investment needed in future years continues to grow, and that investment will consume a larger share of the economy, placing a greater burden on future taxpayers and ratepayers.

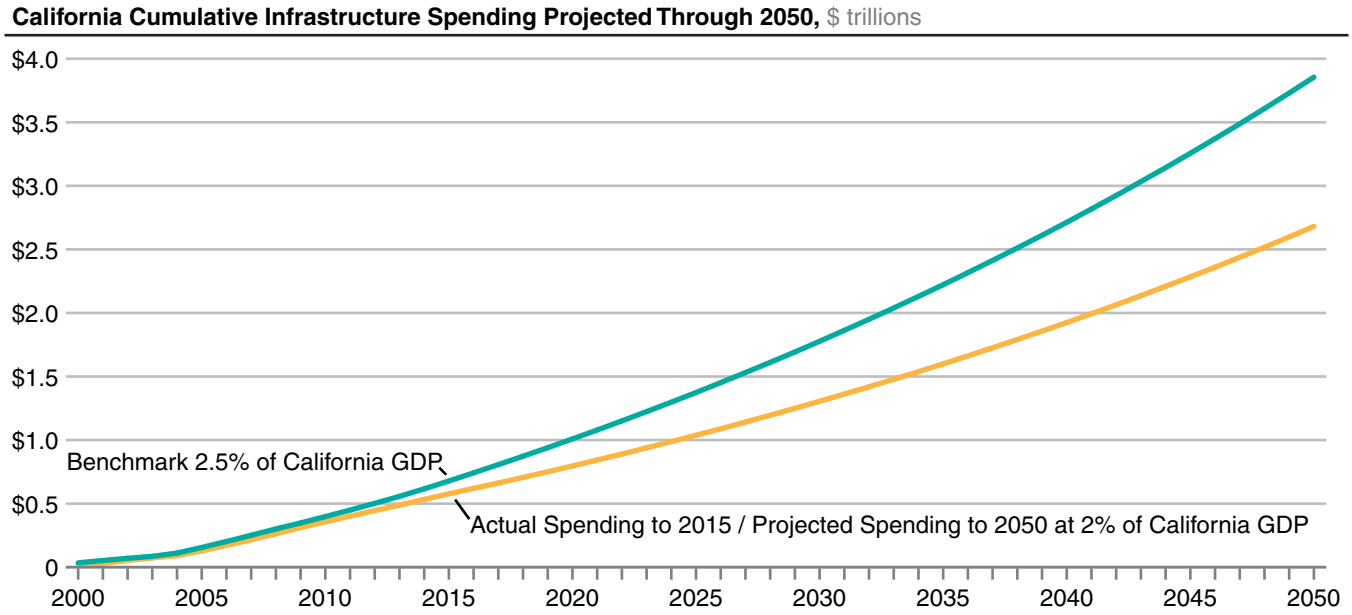
This infrastructure funding gap will become unmanageable over the long term if not addressed now. Assuming that the state GDP and California's average capital spending from the past 10 years grow at just 2% through 2050, the cumulative shortfall in infrastructure investment will grow to more than $1 trillion. If California continues on this trajectory, critical infrastructure at both the state and local levels will continue to deteriorate, and new assets that could spur economic growth and improve the quality of life for Californians will not be built.

Grade given to America's infrastructure by the American Society of Civil Engineers on the 2017 Infrastructure Report Card

D+

Figure 4

Assuming that California's capital spending grows at just 2% through 2050, the cumulative shortfall in infrastructure investment will grow to more than $1 trillion.



Source: U.S. Census, Bureau of Economic Analysis

Analysis: Bay Area Council Economic Institute

California has recently taken steps in the right direction, most notably the passage of SB 1 in April 2017, a measure that will generate $54 billion over the next decade for transportation projects. The revenue comes from higher taxes on gas and diesel fuels and from a new transportation improvement fee paid at vehicle registration. The bulk of the SB 1 funding will be used by Caltrans, counties, and cities for "Fix It First" road maintenance and rehabilitation and for new transit projects. Hundreds of projects are already in design or construction, thanks to this newly available funding, many of which could not go forward in its absence. This SB 1 revenue could be particularly important if a federal infrastructure bill with state matching fund requirements passes in the next year.

While SB 1 is a significant step forward, it addresses only a small part of California's longer-term infrastructure needs and, notably, was the first such increase *in 24 years*. More funding across a much wider range of sectors is needed. Beyond transportation, these include water, wastewater, dams, levees, solid waste, parks, energy, airports, ports, and public buildings. Investing additional resources—as well as developing innovative strategies to accelerate infrastructure investment and promote improved performance and long-term resilience—remains a priority and a critical unmet challenge.

1 to 3%

is the typical average for P3 cost or schedule overruns, compared to

15%

or more for traditional procurements

The Role of Public-Private Partnerships

The shortage of funding is not the only cause of California's infrastructure investment gap: there is also a lack of capacity in public agencies for developing and managing complex procurements and effectively maintaining infrastructure assets over their useful lives. Many agencies have listed priority projects in their capital budgets for years or decades with little progress toward their development. Far too often, the public sector spends considerable time and resources studying projects—frequently hiring consultants that have little experience or incentive to move projects to completion—but makes little progress toward actually building them. When major projects are built through traditional forms of project delivery, they are rarely completed on time and on budget or maintained properly following completion.[10]

Given California's growing infrastructure funding gap, business as usual is not sustainable. State and local governments cannot afford to spend years studying projects, absorb major cost overruns, or allow assets to deteriorate due to inadequate maintenance. Performance-based approaches such as public-private partnerships are not the only answer to these challenges, but they can help address them, particularly for large and more complex projects. At its best, the P3 process incentivizes the private sector to move projects to completion instead of spending years and millions of dollars on consultant studies. It also provides contractual certainty on budgets, schedules, and long-term asset maintenance. In a typical contract, the private partner gets paid only if a project reaches financial close, is delivered on time and on budget, and is properly operated and maintained for the life of the partnership. A number of comparative studies across sectors have found minimal cost or schedule overruns for P3 projects—typically 1–3% cost overruns on average, compared to 15% or more for traditional procurements.[11]

Like any form of procurement, poorly-structured public-private partnerships can result in undesirable outcomes for the public and private sectors. Critics argue that P3s frequently do not provide the transfer of risk that they promise and that the public sector remains responsible for many types of cost overruns which, combined with a higher cost of capital, results in higher costs for taxpayers and ratepayers. There are undoubtedly examples where poorly-structured contracts have resulted in negative outcomes for the public. Under the oft-maligned Chicago parking meter deal, for example, the city leased its parking meter business for 75 years in exchange for a $1.15 billion upfront payment. Rising parking rates and the frequent "true-up" payments the city has to make to the P3 partner in the event of street closures have sparked widespread public opposition. These cases confirm that P3 is not a panacea, that careful upfront attention is needed to ensure that the contract protects the public, and that stakeholders are engaged early and understand the goals and risks of the partnership.

The term public-private partnership itself is controversial. It is different from privatization (with which it is sometimes confused), because long-term ownership remains in public hands. Definitions vary widely, with the broadest applications referring to long-term contracts between private and governmental entities for the provision of public services. Many in the industry believe the term should be replaced with any number of alternatives, given the widely varying understandings of its meaning and the negative connotations that may accompany it in some cases. P3 is, in many ways, a Rorschach test with entrenched opinions of its value. In this report, the term public-private partnership (P3) is used because it is the most widely recognized term in the industry, and we consider that nomenclature issues matter less than the important underlying concepts.

Our definition of P3 encompasses long-term, performance-based contracts with a private partner that involve some combination of the design, construction, financing, operations, and maintenance elements of public infrastructure delivery. This is commonly referred to as design-build-finance-operate-maintain (DBFOM), although this report also includes alternate approaches such as lease/leaseback, build-own-operate-transfer, and other structures. These models can be alternatively described as "performance-based infrastructure" or PBI. The central theme across these approaches is performance-based contracting that accelerates delivery, provides improved value for money, allocates risk to the party best able to manage it, and assures the maintenance of the asset over the life of the agreement.

Life-cycle management is central to the P3 model. Public agencies in California and across the U.S. are notorious for their failure to adequately maintain public assets once they are built. Often this occurs as maintenance is reduced during budget downturns. P3 contracts require the private partner to operate and maintain the assets under their management for the life of the contract (typically 30 years) and to return the asset to public control in good condition. Failure to perform can result in reduced payments or in forfeiture of the contract. While the initial procurement cost of P3s may sometimes be higher than a traditional procurement, this commitment to life-cycle management ensures that the asset will be maintained to a high standard, resulting in lower costs to the public over the life of the project. As ratings agencies increasingly consider deferred maintenance a liability, accounting for long-term asset management will become more essential.

The compensation model is a key distinction in P3 delivery and there are two primary options: revenue risk and availability payment. Under a revenue risk P3, the private partner assumes the risk that the revenue generated by the project will be sufficient to pay back their costs. If revenues are higher, the project will be more profitable, but lower revenues can reduce profitability or even lead to bankruptcy. California's first two P3s (discussed below) were revenue risk highway projects under which the private partners took the risk that tolls would be sufficient to pay back the costs of financing and maintaining the projects. Similarly, private developers take revenue risk under some of the student housing partnerships discussed below. Under an availability payment structure, the public makes payments to the private partner as long as the project is delivered, operated, and maintained according to the contract, while the public remains responsible for collecting sufficient revenue (from user fees or other government revenues) to make those payments. If the private partner fails to perform to the specifications of the contract, it may incur financial penalties or risk termination of the agreement. The private partners are therefore heavily incentivized to operate and maintain public assets to a high standard.

California P3 Background

In 1989, California was one of the first states to pass P3 legislation, and two of the nation's first P3 highway projects were built in Southern California under that legislation.[12] Few P3s were completed immediately following those first pilot projects, but a number of high-profile projects have been completed across the state in the past 5–10 years. These cover both transportation and social infrastructure (public facilities).

The state's enabling legislation has evolved in the past twenty years, and building on past legislation, several parts of the California code govern P3 contracting today.[13]

State and Regional Transportation: In 1989, California's first P3 legislation, AB 680, authorized up to four toll road demonstration projects. Two projects , SR-91 in Orange County and the South Bay Expressway in San Diego County, were developed under that legislation before it expired in 2003.[14] Those projects were controversial, particularly the South Bay Expressway which entered bankruptcy due to contractor disputes and lower than expected toll revenues, but the public was able to acquire the toll road at a lower cost after the original investors lost their money. In 2006, AB 1467 again authorized four P3 highway projects but included a number of restrictions, and as a result no projects were developed under that legislation. In 2009, Governor Schwarzenegger signed SB 4, which authorized Caltrans and regional transportation agencies to enter into an unlimited number of transportation P3s. Only one project, the Presidio Parkway in San Francisco, was finalized before the authorization expired on January 1, 2017. Since then, P3 delivery of state highway projects has not been authorized in California.

Local Government: The California Infrastructure Finance Act (California Government Code Section 5956) was adopted in 1996 and provides broad authorization for local government agencies to enter into P3s for fee-producing infrastructure facilities including water, solid waste, and energy utilities, airports, harbors, transportation, and transit projects. The Infrastructure Finance Act requires that selection be based on qualifications, that the facility be operated at a fair and reasonable price, and that

there be a competitive negotiation process, but otherwise leaves agencies with broad latitude on how to conduct the procurement.

High-Speed Rail: The California High-Speed Rail Act of 1996 authorizes the High-Speed Rail Authority to enter into a wide range of P3 transactions. As discussed below, this authority has not been utilized to date, but it could be as high-speed rail advances.

Courthouses: Authority for the Judicial Branch to enter into P3s was passed in 2007.[15] The Long Beach Courthouse was recently completed under this authorization.

Global P3 Adoption

Public-private partnerships have been implemented more extensively internationally than in the U.S., particularly in the U.K., Australia, and Canada as discussed below. While the origins of the model extend back further, the U.K. and Australia began to use P3 delivery methods widely in the early 1990s. Canada has developed one of the most robust P3 markets over the past decade. There have also been active P3 markets in continental Europe and South America, and it is expected that a robust market will develop in Asia in the coming years.

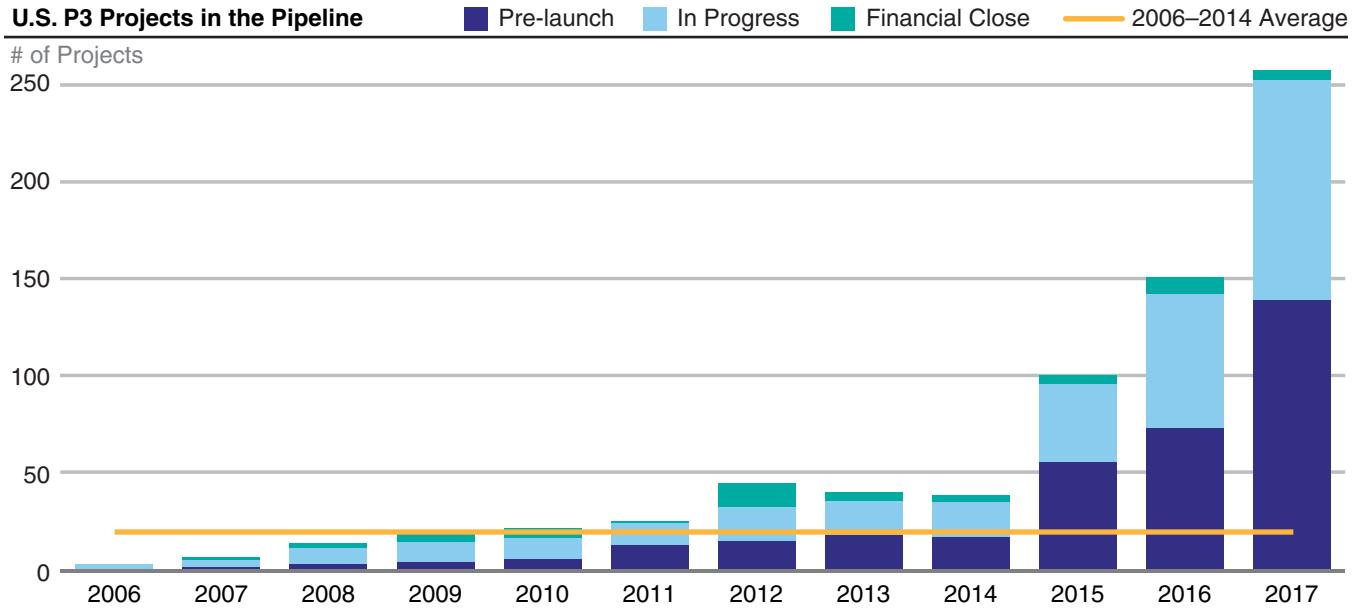
U.K: The U.K. has delivered over 700 projects totaling £55 billion in capital investment through P3s, including investments in schools, hospitals, roads, housing, prisons, and military facilities.[16] P3 makes up a small but influential part of overall infrastructure procurement, and the national government has continued to study and evolve the model. The government established guiding principles in 1992 in the Private Finance Initiative (PFI) under which most P3 projects have been delivered and, after extensive review, it updated those principles in 2012 with Private Finance 2 (PF2) to improve transparency, procurement efficiency, flexibility, and value for money.

Australia: Australia has been a pioneer in P3 procurement. Annual project development varies significantly from year to year, with an average of seven projects completed annually between 2004 and 2015, primarily in social infrastructure and transportation.[17] Under the National PPP Policy and Guidelines, the Australian, state, and territory governments will consider P3 for any project with a capital cost over A$50 million.[18] P3s have been adopted most widely in New South Wales and Victoria, where they account for about 10% of total government infrastructure procurement.[19] One review of Australian P3 procurement found that P3 projects experienced 1% cost overruns on average compared to 15% for traditional projects. P3s were also found to be completed 3.4% ahead of time on average while traditional projects were completed 23.5% behind schedule.[20]

Canada: Since they were first introduced in the early 1990s, over 200 P3s have been completed in Canada. The provinces of British Columbia and Ontario have been the leaders, and nearly every province has completed at least one P3 project. British Columbia established Partnerships BC in 2002–2003 and adopted a policy (repealed in 2017) that any project over C$50 million supported by provincial money was required to use P3 delivery unless there was a compelling reason not to. Partnerships BC leads procurements on the behalf of public agencies in the province and has standardized contract documentation to significantly reduce transaction costs. There has been some movement away from P3 in recent years as the national P3 agency, PPP Canada, was shut down to be replaced by the Canada Infrastructure Bank, an entity with some similar responsibilities but a larger budget and mandate. In addition, Alberta declared a moratorium on P3s in 2015. Nonetheless, Canada remains among the most active P3 markets globally with 276 active P3 projects totaling C$125 billion and an additional 78 projects in the pipeline.[21]

FIGURE 5

The number of U.S. P3 projects in the pipeline began a dramatic rise in 2015 and by the end of 2017 had grown to more than ten times the 2006–2014 average of 19 projects.



Notes: Project counts reflect the year-end project status. This excludes projects that were classified as cancelled, on hold, moved forward without private financing, were a stake sale, or were refinancing. The 2006–2014 average line represents the average number of projects that were in pre-launch or in progress during those years.

Source and Analysis: The Brattle Group

Visualization: Bay Area Council Economic Institute

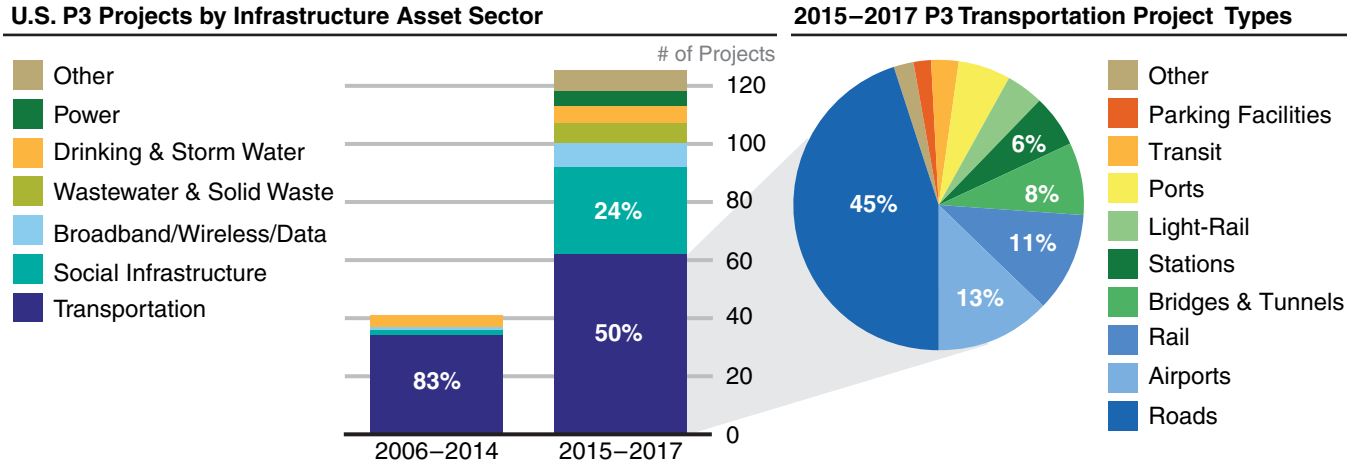
P3 Adoption in the U.S.

California's infrastructure investment deficit mirrors a national deficit, and jurisdictions across the country are trying new methods of procurement. Starting from a low base, the use of public-private partnerships for infrastructure is growing across the U.S., across a wide range of sectors, with projects in more than 30 states plus Puerto Rico and the District of Columbia. Over 200 public infrastructure projects are in procurement as P3s ("in progress"), or have been announced by project sponsors as being in development or under active consideration for P3 development ("pre-launch"). At the end of 2017, the number of P3s on the table across the country was more than ten times the 2006–2014 average of 19 projects. The total value of projects in progress has seen parallel growth.[22]

This activity extends far beyond toll roads, with which P3 is often identified. Half of P3 projects in the country are now in non-transportation sectors such as social infrastructure (civic facilities), broadband, water, and power. While roads account for 45% of P3 transportation projects in the U.S., other categories now include airports, rail, light-rail, tunnels, parking facilities, ports, and bridges. Most of these projects include operation and maintenance. And while public-private partnerships are often considered best suited for larger projects, the U.S. is seeing a growing number of smaller-scale projects.[23]

Figure 6

Projects in the current P3 pipeline are more diversified across infrastructure asset sectors than in the past, and transportation P3s now extend well beyond toll roads.

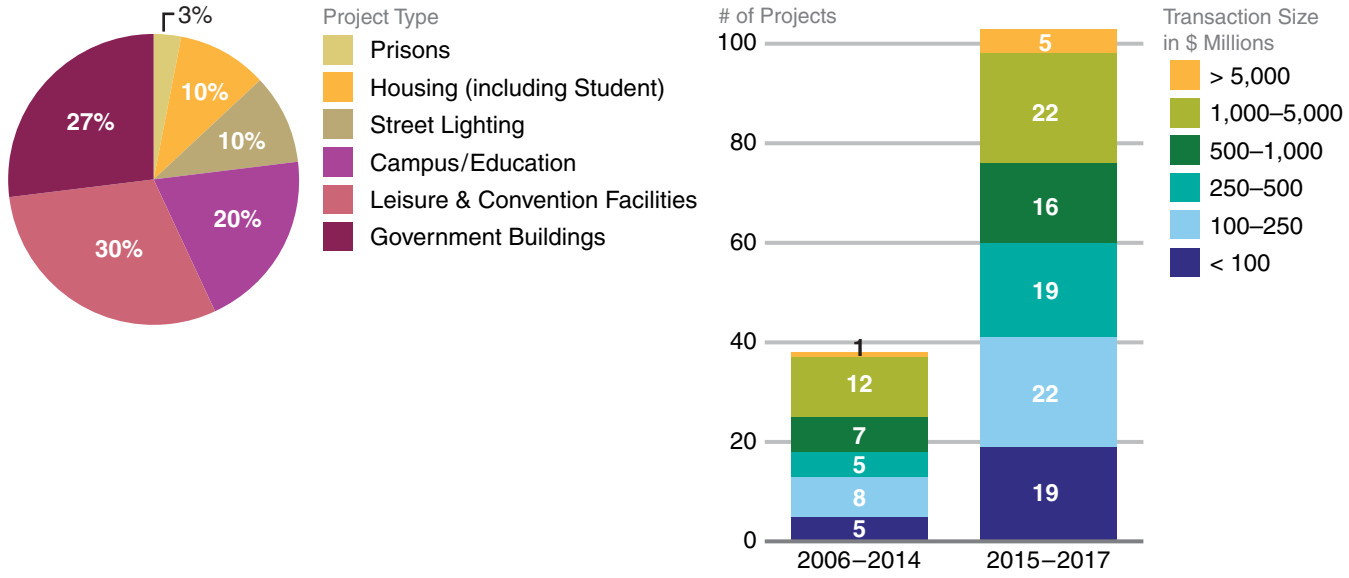


Note: Includes projects that are pre-launch, in progress, or have reached financial close.
Source and Analysis: The Brattle Group

Visualization: Bay Area Council Economic Institute

Figure 7

Projects in the fastest growing P3 category, social infrastructure, span a range of sectors, and the growth in the number of smaller-scale P3s—jumping from 5 before 2015 to 19 after—is also noteworthy.



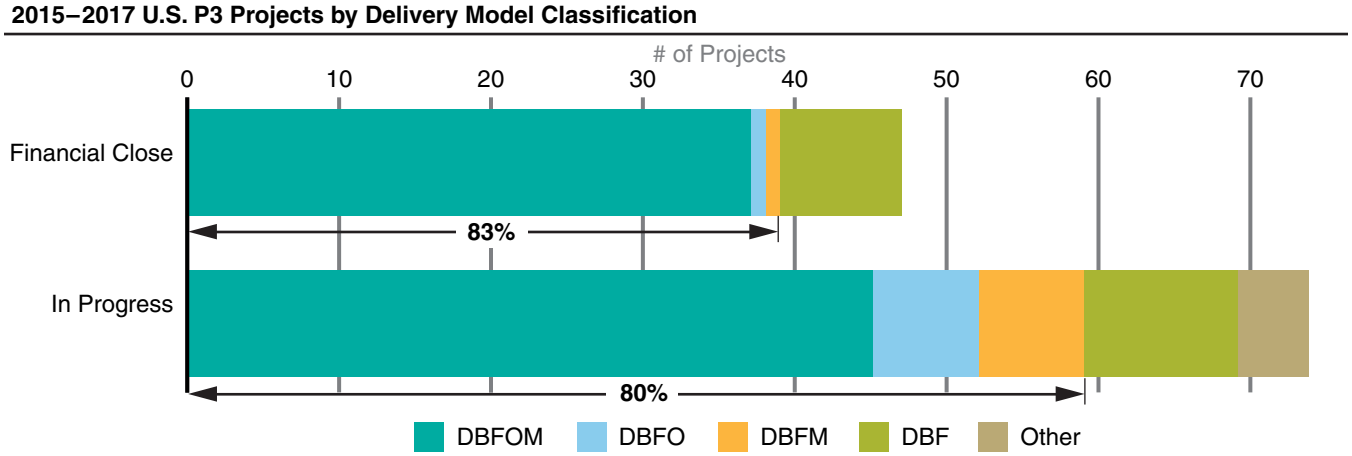
Note: Includes projects that are pre-launch, in progress, or have reached financial close stages; 38% of pre-launch projects, 43% of progress projects, and 98% of financial close projects report transaction size.

Source and Analysis: The Brattle Group

Visualization: Bay Area Council Economic Institute

Figure 8

Operation and Maintenance is included in 80% or more of current U.S. P3 projects.



Note: 68% and 90% of transactions report delivery model classification for in progress and financial close, respectively.
Source and Analysis: The Brattle Group
Visualization: Bay Area Council Economic Institute

A New Challenge: Adaptation to Climate Change

As California works to repair aging assets and build new infrastructure to meet the needs of a growing population, public agencies are increasingly considering how climate change will impact their assets. Given the mismatch between capital needs and available resources, the public cannot afford to make investments that climate change will render obsolete. Rising sea levels, more frequent and severe droughts and floods, increasing heat waves, and declining snowpack, among other challenges, will have dramatic impacts on infrastructure needs and the performance of built systems.[24] Several of the projects highlighted in this report will incorporate climate change impacts into their designs, such as the SR-37 modernization north of San Francisco Bay (see discussion in Chapter 2). There is a growing recognition across the board that major projects will need to include an assessment of potential climate impacts in the future.

The private sector will also need to account for climate risks if P3 is to deliver on the promise of producing more effective life-cycle management of major capital projects. In theory, P3 partners that have at risk long-term capital and contracts 30+ years long should be incentivized to design and build infrastructure that will be resilient to the impacts of climate change. Ratings agencies are beginning to consider the credit implications of climate risk, although it still remains a minor factor. In the longer term, investors, engineers, and asset managers will need to make climate risk a more significant consideration. The public sector can ensure that contracts and procurements incentivize resilience in project design and can seek to partner with equity investors that hold their investment for the life of the partnership rather than selling it to third parties.

Pioneering efforts are underway to measure and certify resilience to climate change impacts in real estate and infrastructure, and such assessments may help investors and public agencies ensure the sustainability of long-term investments. The U.S. Green Building Council, GRESB, and Green Business Certification Inc., for example, provide tools to assess resilience for infrastructure projects[25] with specialized assessment resources for energy assets[26] and open spaces.[27] Green bond certification may provide another avenue for monitoring and verification of a project's environmental attributes, although green bond projects are often focused on climate mitigation rather than adaptation. These and other tools could provide a common framework for designing and building assets that will withstand climate change.

1

California's P3 Experience: The Past Five Years

Over the past five years, public agencies throughout California have completed some of the nation's most innovative P3s. These include the first social infrastructure P3 in the country, the two leading U.S. water P3s, and the largest social infrastructure P3. Numerous innovations within these procurements are being replicated in other transactions around the country. This chapter describes the most significant California P3s in recent years and highlights their outcomes and key innovations.

Long Beach Civic Center

Sector: Social Infrastructure

Deal Size: $520 million

Public Agency: City of Long Beach, CA

Concessionaire Team: Plenary Properties Long Beach (t/a Plenary Edgemoor Civic Partners); *Equity Investor,* Plenary; *Design-Build Contractor,* Clark Construction; *O&M Provider,* Johnson Controls.

Timeline: *RFQ,* March 2013; *RFP,* February 2014; *Selection,* December 2014; *Financial close,* November 2016; *Project completion,* June 2019; Contract end, 2059.

Highlights: Faced with the need to upgrade unsafe and obsolete civic buildings, the City of Long Beach challenged the private sector to deliver and operate new state-of-the-art facilities at an annual cost no greater than what the city was paying to maintain its existing buildings. The city and its partner are achieving this goal by allowing the private sector to develop a revenue-generating mixed-use development on a portion of the city-owned land. Communities around the state are now looking to replicate this model.

Project Background: In 2007, the City of Long Beach discovered significant seismic deficiencies in its city hall.[28] The city hall and the neighboring library were nearly 40 years old, expensive to maintain, and no longer served the city's needs. It was estimated that addressing the seismic deficiencies alone would cost $194 million (2013 dollars) which would still leave the city with functionally obsolete buildings. Given budget constraints, the city needed to limit the annual cost it would pay for the delivery, operations, and maintenance of a new complex to the amount it was previously paying to maintain its outdated facilities, with adjustments only for inflation. Not knowing whether that was possible, Long Beach hired Arup Advisory and challenged the private sector to fit the project within the city's existing $13 million annual budget (2012 dollars).

Procurement and Financing: Long Beach issued an RFQ in 2013 and short-listed three respondents. The city issued an RFP in 2014 and selected the Plenary-Edgemoor Civic Partners (PECP) team the same year. Following selection, PECP entered into a 16-month exclusive negotiation period during which PECP and Long Beach negotiated a comprehensive agreement for the $520 million civic center inclusive of a new city hall, a main library, a Port of Long Beach headquarters, a renovated Lincoln Park, and a mixed-use private development. The partnership consists of a 5-year construction period followed by a 40-year operations and maintenance phase. Construction is financed with $239 million in privately placed debt; $213 million in construction loans; $21 million in equity provided by Plenary; and city contributions of cash and land, underwritten by Plenary, totaling $40 million.

Throughout the procurement process and following selection, there has been an extensive public outreach campaign to engage the community in defining the project. This has been seen as a key step to ensure public support for a project that will define the central part of the city and be used by a wide range of stakeholders. The city and PECP team conducted more than 100 community meetings, information sessions, and design charrettes throughout a highly collaborative design process.[29]

Key Innovations: The Long Beach Civic Center is a nationally-recognized model that numerous other communities are now considering. The city's challenge to the private sector to deliver, operate, and maintain new state-of-the-art civic buildings and revitalize its downtown without raising taxes, increasing the impact on the general fund, or impacting its good credit rating was a break-through innovation. Private development will take place on the excess public land, including parcels that result from a more efficient design and layout of the new civic buildings. The land value underwritten by Plenary and the revenue generated from the resulting mixed-use development effectively subsidize the public facilities delivered under the partnership and allow the project to fit within the city's budget. In addition, the city is realizing cost savings by consolidating off-site departments and leases and by incorporating the Port of Long Beach's new downtown headquarters building into the Civic Center, which has allowed the public entities to share certain facilities and reduce costs.

The new facilities are also highly innovative. With a 40-year project timeframe, the PECP team could balance upfront capital costs with investments in designs and technologies that will minimize long-term operating costs. This led to incorporation of a wide range of sustainability measures that minimize environmental impacts and operating costs. The project will reduce greenhouse gas emissions by over 50% and consume only 25% of the electricity used in the existing building. All of the new public buildings will be rated LEED Gold or better.

Results: The project is currently projected to be delivered on time and on budget with an expected mid-2019 opening of the new city hall, library, and Port of Long Beach headquarters. The new Lincoln Park is expected to be completed by the end of 2020, with an improved design that will increase public use and access. If the project continues to perform to plan, it can be expected to revitalize downtown Long Beach, spur new economic growth, and replace unsafe, obsolete facilities with state-of-the-art buildings that meet the city's needs without increasing expenditures in the city's existing budget.

UC Merced

Sector: Social Infrastructure

Deal Size: $1.3 billion

Public Agency: University of California, Merced

Concessionaire Team: Plenary Properties Merced; *Equity Investor,* Plenary (100%); *Design-Build Contractor,* Webcor Builders; *O&M Provider,* Johnson Controls.

Timeline: *RFQ,* September 2014; *RFP,* January 2016; *Selection*, June 2016; *Financial close*, August 2016; *Project completion,* 2018–2020; *Contract end,* 2055.

Highlights: The Merced 2020 Project presents a model for stakeholder engagement. From the start, a vocal public champion and a dedicated multidisciplinary staff team broke down internal barriers to the project, got buy-in from other staff, decision makers, and the community, and proactively addressed obstacles. The design process has featured in-depth collaboration between the private partner and stakeholders to ensure that the project meets their needs.

Project Background: The University of California, Merced first opened for classes in 2005 with 875 students. Over the following 10 years, the campus grew to 6,800 students and 1.2 million square feet of facilities. With a goal of becoming financially self-sustaining and serving a population of 10,000 students, university leadership recognized that it needed in a short period of time to add a wide range of new facilities including academic, administrative, research, recreational, and residential buildings, essentially doubling the size of the student body and the campus. The Bay Area Council Economic Institute first explored the potential for P3 delivery of the campus needs in a 2010 white paper.[30]

Procurement and Financing: The university began by asking campus stakeholders what they needed. As the university defined its needs and its budget, it issued an RFQ in 2014, not knowing what the response would be. It received six responses and settled on a short-list of three teams. All of the initial RFP responses were above the budget the university had established prior to commencing the procurement. After receiving the bids, the campus consolidated some space elements to gain efficiencies and issued a revised RFP requesting best and final offers. Plenary Properties Merced was the only team to submit a bid under the proposed budget, and financial close was reached in August 2016 with construction commencing shortly thereafter in September.

The partnership has a total capital budget of $1.3 billion and will deliver the buildings in three phases beginning in fall 2018, with substantial completion of all facilities by fall 2020. The concessionaire is responsible for maintenance of major building systems within the facilities for 35 years following completion. The project is being financed with $600 million in external university funding (UC system debt), $590 million in developer funding, and $148 million in campus funds. This blend of public and private capital effectively shifts the risk to the concessionaire while minimizing the cost of capital by including a substantial amount of tax-exempt debt. The financing and O&M will be repaid, subject to building performance, through a combination of state general fund allocation and campus funds.

Key Challenges: The key challenge for UC Merced was to fit its ambitious vision for the campus within a limited budget. This became painfully clear when all of the bids it received from the initial RFP exceeded the upset limit. But the university had a clear vision for its needs—as opposed to wants—which allowed it to redefine the

UC Merced

project scope to fit within the available budget and still meet the community's core goals. Where other procurements might have failed at this point, UC Merced's flexibility and extensive community outreach allowed it to move forward.

Key Innovations: The Merced 2020 Project, the first and to date only social infrastructure P3 in the U.S. of over $1 billion, is notable for a number of key innovations in stakeholder engagement, procurement, and delivery. The university began engaging stakeholders early in the process, led by Chancellor Dorothy Leland, who championed the project from the beginning. A dedicated team from across the campus worked to advance the project and to educate the Regents as well as other staff, labor, and the broader campus community. The group anticipated potential obstacles and structured the partnership to minimize those impacts. The university continued this engagement following the RFP, engaging expert architects to serve as an interface between the P3 design team and the university to ensure that the facility design meets stakeholder needs. This led to changes in the design of laboratory and food service facilities as the design progressed—but within the project's initial budget parameters.

The performance-based procurement was designed to accelerate delivery of the project, maximize innovation to fit the project within the university's limited budget, and ensure long-term budgetary certainty regarding maintenance costs. The RFP asked respondents to develop a given number of assignable square feet rather than gross square feet, which allowed the teams to be creative in meeting the campus' goals without dictating how the buildings were to be constructed. The university provided respondents with area data sheets specifying the type, variety, and quality of space they needed to meet university objectives, as well as specifying certain operating parameters such as temperature and the type of light. This gave teams a clearer idea of how the campus wanted its spaces to function without dictating exactly how those goals were to be met. The RFP also had each of the teams provide early construction drawings and designs for each of the first buildings delivered during the procurement, so that they would be prepared to begin construction immediately following financial close and meet the ambitious schedule.

The project is also innovative in its requirement that the developer incorporate strategies that will enable the campus to meet its meet its goal of achieving triple net zero status (zero net energy, zero landfill waste, and zero net greenhouse gas emissions). Sustainability was scored in the procurement, ensuring that teams would factor these goals into their design. The approved design will result in at least LEED Gold status for all buildings, and it includes stormwater capture and aquifer recharge features.

Results: The campus is under construction and on track to be completed on time and on budget. The procurement is already considered a model for its ability to reach financial close in a short period of time and meet the campus core needs on a tight budget.

Rialto Water & Wastewater Partnership

Sector: Water & Wastewater

Deal Size: $172 million

Public Agency: City of Rialto, CA

Concessionaire Team: Rialto Water Services; *Equity Investors,* Ullico Infrastructure Fund and Table Rock Infrastructure Partners; *O&M Provider,* Veolia North America; *Design-Build Contractor,* AECOM-Lyles Joint Venture.

Timeline: *RFQ,* 2009; *RFP,* March 2010; *Selection,* March 2012; *Financial close,* November 2012; *Project completion,* ongoing; *Contract end,* 2042.

Highlights: In addition to overhauling the city's water and wastewater infrastructure, the Rialto partnership provided an upfront $35 million payment to the city that has catalyzed substantial economic development. The city invested a portion of those

funds in the redevelopment of a former airport site, which is now home to a growing number of distribution centers and other businesses. The city has already earned back the capital it invested in the project, and it expects to create 11,000 permanent jobs when the property is built out.

Project Background: In 2012, Table Rock Infrastructure Partners closed the first water and wastewater P3 of its kind in Rialto, a city of 110,000 people 40 miles east of Los Angeles. The city's water and wastewater system was in need of a major upgrade. At the same time, the city was facing broader economic challenges. Unemployment rates were 14% when the Rialto partnership was signed, the city had laid off 20% of its staff, and new jobs were a central focus of the city council. Recognizing these needs, the city decided to enter into a long-term partnership that would fund rehabilitation of the utility and provide an up-front payment to the city in order to spur economic growth.

Procurement and Financing: Rialto initiated a two-phased procurement with an RFQ in 2009, followed by an RFP in 2010, and selection of the Table Rock team in 2012. Table Rock and the city negotiated a 30-year water and wastewater partnership agreement and reached financial close in November 2012. Table Rock and majority equity investor Union Labor Life Insurance Company (Ullico) Infrastructure Fund raised $172 million for repair of the utility system, an upfront payment to the city, funding of reserves and rate stabilization accounts, and other purposes. The financing consists of 15% equity and 85% privately placed debt. Table Rock's subcontractor, Veolia North America, took full responsibility for operations and maintenance of the system for the 30-year term of the partnership.

Key Challenges: Financing the Rialto partnership was a challenge, due to the city's tenuous financial situation and the recent bankruptcy of neighboring San Bernardino. Furthermore, as the first water and wastewater partnership of its kind in the country, there were few precedents to reassure potential investors. The robust financial structure of the partnership eased these concerns, and the up-front and annual payments provided a plausible path for the city to address its financial difficulties and remain a strong partner for the life of the contract.

Key Innovations: The Rialto water and wastewater partnership creates a unique alignment between the private partner and the city administration, employees, and utility workers. The city retains ownership of all assets, water rights, and rate-setting authority, as well as a seat at the table in long-term management of the system. The city's utility director, as well as other staff and elected officials, approve annual budgets, oversee major capital projects, and approve monthly cash movements. All existing workers were written by name into the contract and guaranteed employment. The majority of the equity was invested by the Ullico Infrastructure Fund, meaning that labor not only has a controlling vote in all of the concessionaire's decisions, but also that financial returns pay union pension retiree benefits. Finally, all financial upsides from performance improvements in the system flow back to the city, while returns to the private partner are fixed for the life of the agreement, thus creating no incentive for the private partner to either cut corners or drive up rates.

Results: The Rialto partnership has delivered strong results for the utility and the city as a whole. The major capital projects are all completed or in the process of completion, resulting in a major rebuild of seriously degraded assets. Utility operations have performed well for the first five years, and a new proactive asset management plan is in place for identifying and prioritizing repairs and upgrades as they arise. Financial performance has been better than planned, and the City of Rialto has received 32% in excess performance dividends in the first 5 years, allowing it to defer rate increases, fund a conservation program, and add a dedicated utility director.

The economic development investment made by Table Rock has also enabled Rialto to make stormwater, street, and sewer improvements to support the redevelopment of the city's airport property, which is now home to a growing number of businesses including multiple distribution centers. This investment has helped establish 5,000 new permanent jobs to date, with a total of 11,000 new permanent jobs expected by 2019. The city has already earned back the capital it invested in the project, and it now has the benefit of a larger tax base for the foreseeable future.

Long Beach Courthouse

Sector: Social Infrastructure

Deal Size: $492 million

Public Agency: Administrative Office of the Courts (AOC)

Concessionaire Team: Long Beach Judicial Partners; *Equity Investors,* Meridiam (60%) and QIC Global Infrastructure (40%); *Design-Build Contractor,* Clark Construction; *O&M Provider,* Johnson Controls.

Timeline: *RFQ,* November 2008; *RFP,* June 2009; *Selection,* June 2010; *Financial close,* December 2010; *Project completion,* November 2013; *Contract end,* 2048.

Highlights: The Long Beach Courthouse was the first social infrastructure P3 in the United States. The delivery team pioneered a design process that would deliver the project on time and on budget while ensuring that it met the unique demands of the judges, sheriffs, and public that use it. Despite intensive collaboration with stakeholders, the project was delivered two years faster than the comparable San Bernardino Justice Center that was delivered under traditional procurement.

Project Background: In 2007, the Judicial Council of California produced a feasibility study for replacement of the old courthouse in Long Beach, using a P3 approach that was new for the U.S. at the time. The existing courthouse was physically deficient, overcrowded, unsafe, and had issues with mold, leaks, termite infestations, and general disrepair. Renovation of the existing facility was considered but deemed prohibitively expensive due to the costs of gutting the building and temporarily relocating the courthouse activities.

In addition to the risk and schedule benefits of P3, the guaranteed maintenance of the new facility by the private sector partner for the life of the contract was an important consideration for California's Administrative Office of the Courts (AOC), given the large amount of deferred maintenance throughout the court system.

Procurement and Financing: In 2008, the Administrative Office of the Courts issued an RFQ, and five of the eleven responding proposals were placed on the short-list. Three responded to the RFP issued in June 2009, and in 2010 Long Beach Judicial Partners, LLC (LBJP) was selected to deliver the project. LBJP delivered the 530,000 square foot, $492 million courthouse and is responsible for operations and maintenance for 35 years following completion. The project was financed with $49 million in equity and $443 million in seven-year, floating-rate mini-perm loans[31] for the construction period. Those loans were refinanced with 34-year fixed rate bonds in 2013. Availability payments to LBJP began after occupancy of the facility. The payments are subject to deductions in the event that the buildings are not operated or maintained according to the required performance standards.

Key Challenges: The volatility of the capital markets following the financial crisis in 2008–2009 was a major challenge in financing the project and delivering it in a timely manner. Given the financial uncertainty, long-term debt was not an option at the time. In order to move the project forward, LBJP chose to use short-term loans that would finance the construction period and give the team a period of several years during which they could refinance the loans with longer-term debt. While this approach exposed LBJP to refinancing risk, it prevented significant delays that other comparable projects at the time experienced.

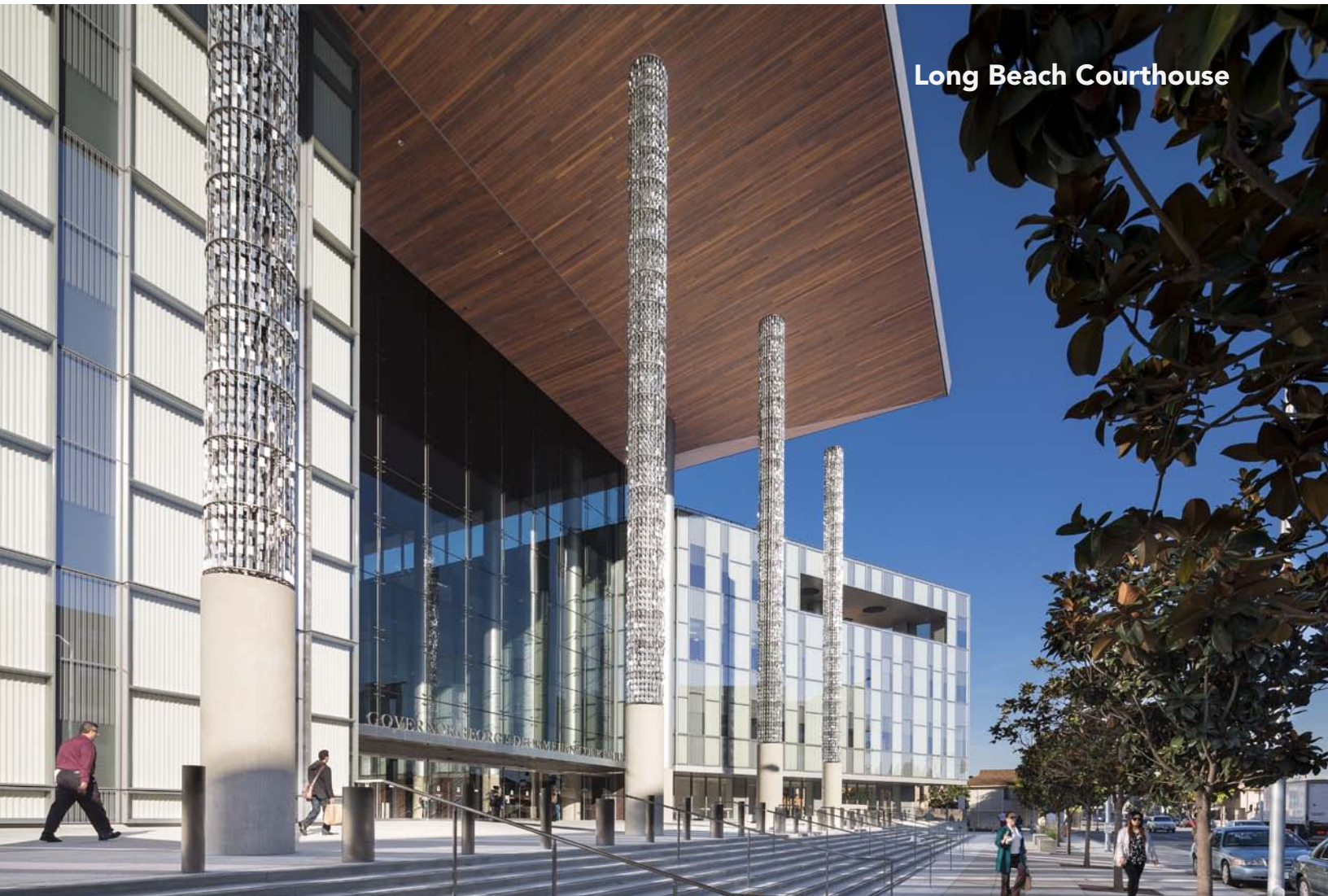
Key Innovations: The Long Beach Courthouse was the first true social infrastructure public-private partnership in the U.S. A particular concern for the LBJP team was ensuring that the facilities would meet the approval of the judges, sheriff, and court administrators that would be using it in the following decades. The team built three courtroom mock-ups to test interior designs and layouts, two more mock-ups than were required by the contract. Judges and other officials were invited to test the plywood mock-ups, and LBJP conducted a mock

trial in the test facility before construction began on the 31 courtrooms. This avoided costly changes later in the process and ensured that the facilities were well suited to the unique requirements of the stakeholders. LBJP used a similar process with the Sheriff's Department for the holding cells.

Results: The courthouse project was successfully completed in August 2013, ahead of schedule. LBJP completed the project on budget, with no disputes or claims, and used less than half of the $10 million allowance for AOC-directed change orders. The operations and maintenance phase has been successful to date, and repeated post-completion surveys show a high level of satisfaction with the facility.

There has been debate about whether the P3 approach delivered value for money for AOC. The Legislative Analyst's Office (LAO) issued a critical analysis of the P3 delivery in 2012, arguing that the project was not well suited to P3 and that the original value for money analysis overstated the cost savings. As a result, the LAO argued that the P3 delivery ultimately produced a higher cost for the state.[32] The AOC refuted the LAO's criticism, arguing that the value for money analysis was a rigorous process in line with best practices, and stood by the conclusion that the P3 delivery benefited the state.[33]

Perhaps a more useful assessment of the value of P3 delivery in this case is a real-life comparison with the San Bernardino Justice Center, which is a facility of similar size and quality that was delivered in the same construction market at a similar time. The San Bernardino project used Construction Manager at Risk (CMR) delivery. The Long Beach Courthouse was delivered 23 months faster due to the integrated nature of the procurement and the flexibility of the private financing market. The projects had similar costs per square foot, but the Long Beach project was reported to have higher quality mechanical and electrical equipment and a more flexible configuration that allows for conversion of leased space into additional courtrooms in the future.[34]



Long Beach Courthouse

Presidio Parkway

Sector: Transportation

Deal Size: $365 million

Public Agency: Caltrans and San Francisco County Transportation Agency

Concessionaire Team: Golden Link Partners; *Equity Investors*, HOCHTIEF (50%) and Meridiam (50%); *Design-Build Contractor,* Kiewit Flatiron JV.

Timeline: *RFQ,* February 2010; *RFP,* May 2010; *Selection,* January 2011; *Financial close,* June 2012; *Project completion,* July 2015; *Contract end,* 2045.

Highlights: The Presidio Parkway provides a unique opportunity to compare P3 against traditional procurement approaches within a single project. The first phase was delivered under a traditional design-bid-build (DBB) contract and experienced cost overruns and delays. The second phase used a P3 approach and was delivered on time and on budget, with the exception of landscaping work which was delayed by disagreements between public agencies.

Project Background: Doyle Drive is a 1.6 mile stretch of Highway 101 through San Francisco, which provides access to the Golden Gate Bridge and Marin County. It was originally built in 1936, and upgrades to improve safety and capacity on the roadway were debated for decades before the San Francisco County Transportation Authority and Caltrans selected the Presidio Parkway option in 2006. By that time, significant portions of the existing Doyle Drive structures had reached the end of their useful life and required upgrades to reduce seismic risk and improve traffic safety. The Presidio Parkway project included construction of six traffic lanes, expanded shoulders, two 1,000 foot tunnels, and other elements.

Procurement and Financing: The Presidio Parkway was delivered in two phases, with the first phase delivered through traditional design-bid-build starting in 2009. Phase I was scheduled to be completed by early 2011 but experienced significant delays and cost overruns due to change orders before its eventual completion in June 2013. Caltrans assessed delivery options for Phase II, which includes roughly double the amount of physical construction work as Phase I. A value for money analysis found the P3 alternative to be the most cost effective. An RFQ for the Phase II P3 was issued in February 2010, and a short-list of three teams was selected in October. In January 2011, the project was awarded to Golden Link Partners. The winning bid represented over 30% cost savings relative to the owner's estimates.

The partnership has a 33-year term, including three years for construction and 30 years for operations and maintenance. Total capital cost of the project is $365 million financed with 42% TIFIA loans, 45.5% bank loans, and 12.5% equity. The project is paid for through a combination of milestone payments during the construction phase and availability payments through the duration of the contract.

Key Challenges: From the outset, the Presidio Parkway generated controversy. The California Legislative Analyst's Office disagreed with the value for money analysis, challenging many of the assumptions and the cost savings that proponents argued the P3 would deliver. The Professional Engineers in California Government (PECG)—a public-sector union which has strongly opposed all P3 development—challenged the P3 procurement, arguing that it violated California's Streets and Highway Code and filing suit to block the P3. The lawsuit was eventually dismissed, but it delayed the project by over a year and added tens of millions of dollars in construction delay costs.

The challenges did not end there. The project required coordination with a wide range of local, state, and federal agencies, which would have likely caused delays regardless of the delivery method. Most significantly, the National Park Service and the Presidio Trust own the right-of-way—rather than the lead procurement agency, Caltrans—and coordination among these agencies has consequently been very challenging. There has been particular disagreement over the quality of the soil and

other landscaping components associated with the tunnel-top park to be delivered as part of the parkway project. This disagreement, among others, has caused substantial delay in the completion of the project's final landscaping. The highway itself reached substantial completion on schedule.

Key Innovations: The Presidio Parkway was a technically and politically challenging project that incorporated notable innovations in procurement, construction, design, and operations and maintenance. One of the key innovations was the split delivery of the two phases of the project, one under traditional design-bid-build and other under P3. This fit the two major construction phases and was necessary due to the timing of the passage of the State's enabling legislation. As a consequence, it provided a unique side-by-side comparison of project delivery models as discussed below. The construction phase of the Presidio Parkway required significant innovation and careful management to keep the existing thoroughfare open while the new assets were being built. Finally, the design of the project has been recognized for its creativity, integrating expanded transportation infrastructure naturally into the urban landscape and providing residents and visitors with new parkland, recreational opportunities, and educational resources.

Results: A major driver of the P3 delivery for Phase II of the project was cost and schedule certainty. The statewide pre-procurement review of Caltrans' DBB projects over $300 million had found average cost overruns of 76%.[35] Phase I of the project delivered through design-bid-build experienced a delay of 30 months and a cost overrun of 24% relative to the owner's original project budget. The Phase II P3 achieved substantial completion of the Doyle Drive replacement on time in July 2015 but, as noted above, the landscaping portion of the project has experienced significant delays due to disagreements between Caltrans and the Presidio Trust. This impacted the $185 million milestone payment, resulting in a lawsuit by the concessionaire and eventually a $91 million settlement in their favor, due largely to the fact that the delays were driven by the public sector. Nevertheless, due to the significant cost savings achieved in the bidding process, even with this additional cost Phase II will be completed within the owner's original project budget. The remainder of the landscaping work is expected to move forward in 2018.

The delays in the landscaping portion of the Presidio Parkway P3 delivery point to the importance of resolving jurisdictional and contract specification issues where multiple public agencies have ownership or approval rights. That key coordination and design/permit approval issues were not resolved up front has significantly delayed the project. The project also shows that carefully defining of contractual outcomes is essential. Responsibility for those decisions should be carefully defined at the beginning and to the greatest extent possible, so that contractual ambiguity does not cause project delay during the delivery phase.

Carlsbad Desalination Plant

Sector: Water

Deal Size: $992 million

Public Agency: San Diego County Water Authority

Concessionaire Team: Poseidon Water; *Equity Investors,* Stonepeak Infrastructure Partners; *Design-Build Contractor,* Kiewit; *O&M Provider,* IDE Technologies.

Timeline: *Water purchase agreement approved,* November 2012; *Beginning of construction,* December 2012; *Project completion,* December 2015; *Contract end,* 2045.

Highlights: The Carlsbad Desalination Plant has delivered over 30 billion gallons of drought-proof drinking water during its first two and a half years of operation. The San Diego County Water Authority has already seen the benefits of transferring risk to a private partner in the first years of operation. An algae bloom and elevated water temperatures caused disruptions at the plant in 2016–2017, with the private partners isolating the public from financial risk and making necessary upgrades to the plant at no cost to the public.

Project Background: The San Diego County Water Authority (SDCWA) is in the process of reducing its reliance on water from the Metropolitan Water District (MWD) of Southern California—the regional wholesaler that relies primarily on imported water—from 91% of its supply in 1991 to 13% by 2035.[36] The cost of water purchased from MWD has increased steadily over time and SDCWA plans to add a variety of local water sources to lower long-term costs and create a local, drought-proof supply. Desalination was viewed as a critical part of that local water supply, but SDCWA had never built or operated a desalination facility, which made alternative procurement approaches that transfer risk an attractive approach to improve price certainty and ensure long-term operations and maintenance performance.

Procurement and Financing: The Carlsbad Desalination Plant is a 50 MGD reverse osmosis facility developed and partially owned by Poseidon Water, now a subsidiary of infrastructure investment firm Brookfield Infrastructure Partners. Unlike many P3s where a public agency procures and owns the infrastructure directly, Poseidon developed the project privately and holds a Water Purchase Agreement (WPA) with the San Diego County Water Authority, the sole off-taker for the project. In addition to the desalination plant, Poseidon and contractor Kiewit-Shea Desalination built a 10-mile 54-inch pipeline that connects the plant to a regional hub facility on SDCWA's existing system, enabling optimal distribution of product water.

The desalination facility at Carlsbad was first proposed in 1998. Poseidon completed feasibility studies, environmental review, and approvals from numerous local, state, and federal agencies throughout the 2000s. The WPA was approved by SDCWA in November 2012 and the facility began operations in 2015. The project was financed 82% through the California Pollution Control Financing Authority with tax-exempt private activity bonds for the plant and tax-exempt governmental purpose bonds for the pipeline. The remaining 18% of the project was financed with equity.

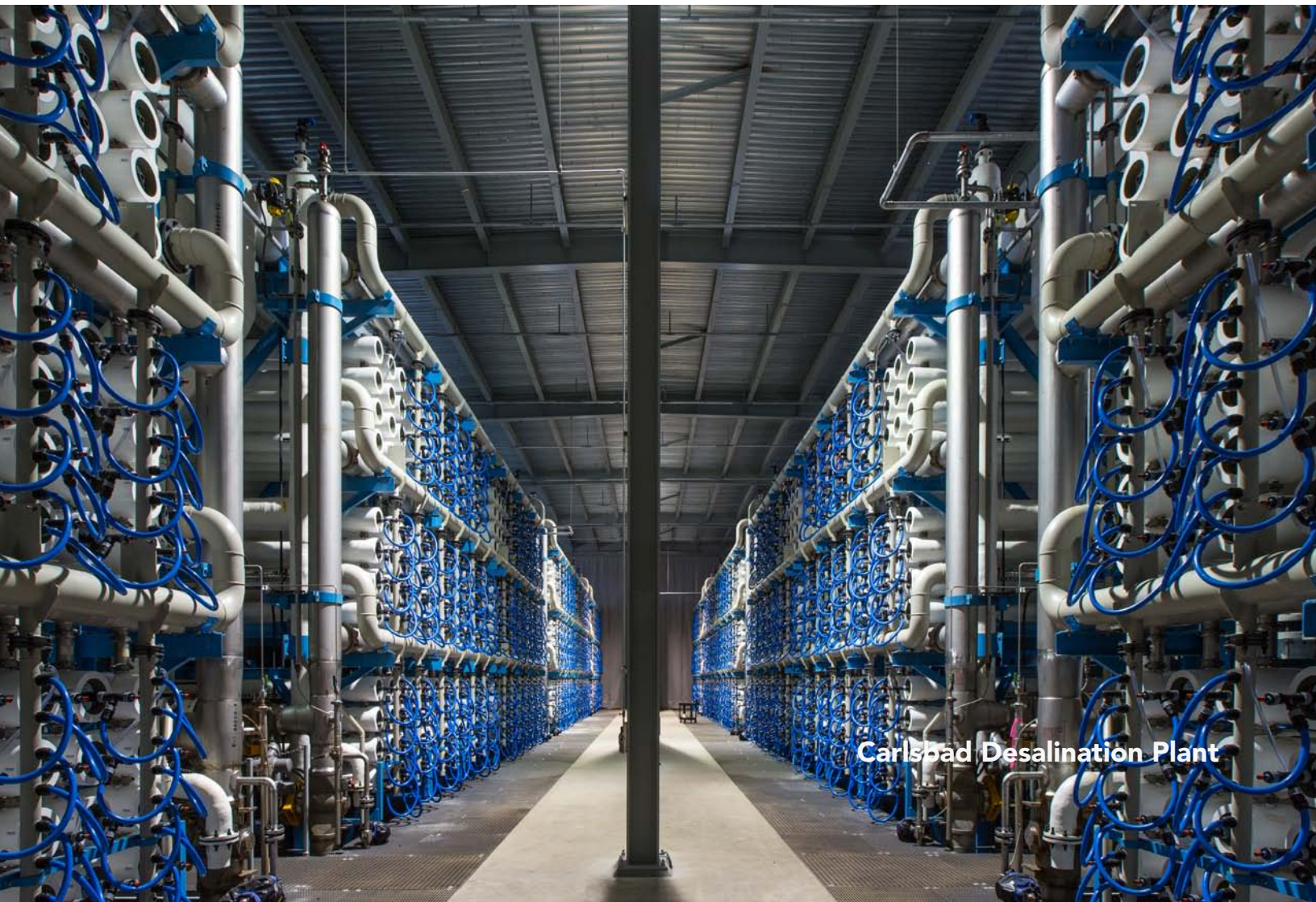
During the 30-year water purchase agreement, SDCWA buys water from Poseidon at a pre-defined price—$2,202–$2,439 per acre-foot in 2017–2018, depending on the volume delivered—with risk for delivering water at a given quality transferred to Poseidon.[37] Despite the higher price of this water relative to existing sources, SDCWA views the desalination facility as adding essential diversity to its water supply portfolio as it works to reduce reliance on imported water. SDCWA has the right to purchase the project for the outstanding equity return after the tenth year of operation, and at the end of the contract, it may purchase the plant for $1.

Key Challenges: Seventeen years elapsed from the time the Carlsbad plant was first proposed until the end of construction. Desalination facilities must complete a complex set of approvals including a review under the California Environmental Quality Act (CEQA), a tidelands lease from the State Lands Commission, a coastal

development permit from the Coastal Commission, and discharge and drinking water permits from the Regional Water Quality Control Board. These processes provided the opportunity for opponents to object, and Poseidon had to defend against multiple legal challenges filed by project opponents before the project was able to move forward with financing and construction. The legal challenges were primarily focused on potential impacts on marine organisms and the facility's energy consumption. Poseidon was eventually successful in defending the project's approvals.

Key Innovations: The Carlsbad Desalination Facility is the largest and most technologically advanced seawater desalination plant in the Western Hemisphere. The plant is the largest source of local supply in San Diego county and serves nearly 10% of regional water demand. Poseidon has implemented a first-of-its-kind greenhouse gas emissions program that offsets all of the incremental emissions associated with electricity used by the facility.

Results: The Carlsbad Desalination Plant was completed on schedule in December 2015. While the plant operated mostly according to plan in the first contract year, algae blooms and higher water temperatures caused disruptions to operations in the following year. As a result, Poseidon delivered 40,000 acre-feet of water in 2016–2017, 18% less than the 48,000 acre-feet minimum in the WPA,[38] requiring the private parties to continue funding debt and operating costs, pay penalties, and make improvements to the plant's treatment system and membranes at their own expense. Since these improvements were completed last year, the plant performance has met the parties' expectations. Representatives from SDCWA have noted that the contractual protections have isolated its ratepayers from the challenges the plant has experienced. In most other forms of procurement, the public would have been responsible for debt and operating costs associated with water that was not delivered and making the upgrades needed to bring the plant online.



Carlsbad Desalination Plant

University of California, San Francisco Neurosciences Building

Sector: Social Infrastructure

Deal Size: $167 million

Public Agency: University of California, San Francisco

Concessionaire Team: *Fee Developer,* Edgemoor/ McCarthy Cook Partners; *Design-Build Contractor,* Clark Construction.

Timeline: *RFQ/RFP,* March 2008; *Selection,* July 2008; *Financial close,* April 2010; *Project completion,* April 2012; *Contract end,* 2042.

Highlights: UCSF used an innovative lease/leaseback structure for its Neurosciences Building which shifts risk for delivering the facility to a private partner while maintaining access to low-cost, tax-exempt bonds. This provides the university with the lowest life-cycle cost for the project.

Project Background: The University of California has used a variety of public-private partnership structures to deliver more than 81 projects including medical office buildings, research facilities, student housing, and other assets.[39] These include ground leases, ground lease/leasebacks, developer build-to-suit, and master leases, among others. One recent project was the UCSF Neurosciences Building on the Mission Bay campus, which was completed in 2012. The goal of the project was to improve collaboration and more efficiently move trials from labs to clinical settings by combining research programs into a single building.

Procurement and Financing: UCSF initiated the procurement in March 2008, selecting the Edgemoor/ McCarthy Cook Partners team in July, and reaching financial close following the design process in 2010. The project was financed with tax-exempt debt through a conduit issuer and nonprofit 501(c)(3) specifically created for the project to access tax-exempt financing. The university leases land to the 501(c)(3) which in turn provides a sub-ground lease to the P3 partner. The Edgemoor team designed and built the facility for a fixed price, schedule, and lease rate and is responsible for operations and maintenance of the building for 30 years post-completion. The P3 team owns the building for the duration of the contract and leases it back to the university. At the end of the partnership, ownership of the building reverts to the university.

Key Challenges: UCSF was facing pressure to deliver the neurosciences building quickly or be at risk of losing funding for the project. Land and a major gift had been donated for the project under the condition that it be completed by a certain date which was rapidly approaching.[40] The campus had recently experienced cost overruns and delays on capital projects and needed to be sure that it wouldn't have the same issues with the neurosciences building project. The P3 structure allowed the campus to accelerate delivery and meet the deadlines.

Innovation: The delivery approach used for the neurosciences building and a number of other UC projects differs from traditional P3 deliveries which include private financing. The 501(c)(3) financing structure allows UC to shift a portion of the risk for delivering the assets while still retaining its access to tax-exempt debt, resulting in a highly competitive life-cycle cost. However, it should be noted that incorporating public financing reduces the effectiveness of the risk transfer to the private partner. The university is responsible for paying back the financing regardless of whether the developer delivers on its long-term operations and maintenance obligations. Furthermore, without an equity investment in the project, the developer has less "skin in the game" and less incentive to ensure long-term project performance. In privately financed P3s that have not performed to plan, private investors have lost their investments and the public has been able to acquire the assets at a reduced cost. Nonetheless, the Neurosciences Building provides a notable innovation in P3 delivery that minimizes financing costs, demonstrating that P3 projects need not follow a single design template.

Results: The Neurosciences Building was completed on time and on budget in 2012 and is now in its sixth year of operation. The $167 million, 237,000 square foot building includes laboratories and clinical spaces and provides work space for more than 600 researchers and staff. In the first years of the contract, UCSF has experienced improved transparency of operating costs and positive responsiveness to service requests.[41] The University of California is now using the same structure to deliver multiple student housing projects.

2

California Pipeline: The Next Five Years and Beyond

California has a number of P3 projects, either in active procurement or in the planning stage, that are expected to be completed in the next five years. Beyond that, there are also a number of large projects that are either considering P3 delivery or that entail the type of scale, complexity, and schedule challenges that a contractually-defined, performance-based P3 procurement is particularly well suited to address. This chapter provides brief descriptions of these projects and the benefits that P3 could bring to their delivery.

Projects in Development, Planned, or Under Consideration

LAX Automated People Mover (APM) and Consolidated Rent-A-Car Center

Los Angeles World Airports (LAWA) recently reached financial close on a $4.5 billion, 2.25 mile electric train system P3 that will connect three stations within LAX to a consolidated rental car facility and intermodal transportation center with access to the Metro light-rail system. LAWA issued an RFQ in June 2016, short-listing all five teams that responded but ultimately receiving bids from three respondents. In early 2018, LAWA selected for the 30-year contract the LAX Integrated Express Solutions (LINXS) team led by Fluor, Balfour Beatty, and three other equity members. Groundbreaking is expected in 2018, and the project is scheduled to be operational in early 2023. LAWA will make a series of milestone payments throughout the design and construction processes plus availability payments over the life of the operations phase of the contract. Payments will come from a combination of airport repayment bonds, existing airport revenues, and passenger facility charges.

LAX Automated People Mover

LAWA is also delivering the Consolidated Rent-A-Car Center (CONRAC) through a public-private partnership. The estimated $1 billion facility will be located 2 miles east of the airport and connected by the APM. Four teams were selected for the short-list in 2017, and the RFP was issued in April 2018. Final selection is expected in late 2018, with project completion by 2023.

Napa Civic Center

For more than a decade, the City of Napa has been considering ways to replace its undersized city hall and consolidate city offices into a single modern facility. The City issued an RFQ for the project in 2015 and an RFP to the three short-listed teams in 2016. In May 2017, the city council selected Plenary as its preferred partner and subsequently entered into a two-year exclusive negotiating period with the developer during which the team is working with the community to design the project.[42] The project consists of a four-story, 130,000 square foot combined city hall and public safety building, along with a new fire station and a parking structure. A mixed-use complex with a hotel, condominiums, and retail space will be developed on the previous city hall location. The commercial development and related tax revenue will reduce the general fund impact of the new civic center. The estimated $110 million project is expected to break ground in early 2019, with a two-year construction period.[43] Plenary Properties Napa will operate and maintain the facility for 30 years following completion. This project has the potential to demonstrate that P3s are not limited to mega projects but can also help smaller communities address their infrastructure needs.

Los Angeles Convention Center

For years, the City of Los Angeles has pursued various plans to modernize and expand its downtown convention center. In 2015, the city was advancing a traditional delivery path, selecting a team to design the renovated facility, and intending to issue $470 million in tax-exempt bonds to finance the project.[44] Later in the year, the City received a report that it had commissioned from Arup Advisory, which concluded that a public-private partnership including a reimagined, mixed-use project with public and private development would reduce the impact on the general fund and increase the project's economic development potential.[45] The city subsequently issued a Request for Information from potential developers in 2016.[46] Currently, Los Angeles is in negotiations for P3 delivery of the modernization project with AEG, the owner and developer of the Staples Center and current manager of the convention center facility, and with Plenary Group.[47]

Los Angeles Civic Center

In 2017, the City of Los Angeles approved a master plan that would fundamentally reshape the civic center area of downtown, which is considered to be underutilized and disconnected from surrounding neighborhoods. The city also wants to reduce its office leasing space costs by building new city-owned facilities. The first phase of the six-part plan involves replacing the former Los Angeles Police Department Parker Center headquarters with a 27-story city office building. Construction on the $500 million project is expected in 2018–2020 and could be delivered by a public-private partnership.[48] Subsequent phases implemented gradually through 2032 would replace City Hall South, the LA Mall, the 911 Call Center, Metro Detention Center, and City Hall East with a mix of residential and commercial space, government offices, parking structures, and parks. Many of the projects are expected to be delivered as public-private partnerships or entirely delivered, owned, and financed by private partners.

Sonoma County Government Center

Sonoma County's administrative center in the city of Santa Rosa was built in phases starting in the late 1950s. Many of the buildings are now reaching the end of their useful life after decades of deferred maintenance. The existing 470,000 square foot campus is spread over 82 acres in an inefficient manner that limits the ability of the current buildings to accommodate a growing workforce. The administrative buildings housing the board of supervisors, county administrator, county permitting, auditor-controller-treasurer-tax collector, county clerk, transportation and public works, and internal service departments need replacement. The county jail and the sheriff's office have better conditions in their current buildings and are likely to remain in those facilities.

Sonoma County is exploring options for replacing the existing administrative buildings. The Long Beach Civic Center appears to be an attractive model for financing and delivering the estimated 500,000 square foot, $350–450 million administrative campus, although the county is still in the preliminary planning phases and is working to develop business cases. The county expects that a more compact administrative center could free up 20–29 acres for mixed use development and reduce the cost of the new county buildings, ideally limiting the annual outlay to their current expenditures on building maintenance and leasing of private office space. The private development could also help alleviate the housing shortage in Sonoma County that has been particularly pronounced since the wildfires in 2017.

Napa Civic Center

Exploratory conversations with potential P3 technical advisors are currently underway, and the County will soon engage with developers to learn more about the model and get feedback on what is being considered in the program. It plans to issue an RFI in the summer of 2018. If that all proceeds according to plan, the County would expect to issue an RFQ in 2019. There is also a possibility that Sonoma County would partner with the City of Santa Rosa to jointly develop a P3 for delivery of the County's administrative buildings and the City's new civic center, which is similarly in need of modernization.

San Vicente Pumped Storage Project

The San Diego County Water Authority (SDCWA) and the City of San Diego are jointly considering development of a pumped storage facility near San Vicente Reservoir. The $1.5–2 billion project would involve construction of a new reservoir above the existing reservoir, connected by a tunnel system and power turbines. Water would be pumped into the upper reservoir during off-peak hours, when electricity is inexpensive, and released to generate electricity during peak hours. The energy storage would help stabilize the electrical grid, which has become challenging to manage with the advent of higher levels of intermittent renewable energy such as wind and solar. These resources generate variable output as the wind and solar radiation fluctuate, impacting the grid's voltage and frequency and, in the absence of storage, less efficient gas turbine plants are required to run in stand-by mode in case they are needed to rapidly respond to changes in the electricity supply. SDCWA issued an RFP for the 500 MW facility in 2017 and from the five responding teams the Tenaska-Diamond Generating Corp. Joint Venture was selected for exclusive negotiations.[49] A lengthy environmental review and licensing process with the Federal Energy Regulatory Commission must be completed before the project can proceed.

Santa Clara Valley Water District

The Santa Clara Valley Water District has initiated P3 procurement for an indirect potable reuse project to provide an additional water supply for Silicon Valley and to recharge the local aquifer. Overpumping of the aquifer has led to subsidence which can disrupt underground utilities. The main components of the $650 million project are a 24 MGD reverse osmosis water treatment plant and an 18-mile, 48-inch pipeline from the plant to the Los Gatos recharge ponds. The district issued an RFQ for the project in 2016 with dual tracks for P3 and progressive design-build delivery of the project. (For the progressive design-build, separate RFQs were issued for the plant and the pipeline.) The District short-listed teams on both tracks and spent the majority of the next year and a half considering which track it would pursue. In October 2017, the board voted to proceed with the P3 track. The two originally short-listed teams will be joined by three additional teams in responding to an RFP expected to be issued in the summer of 2018. The District is pursuing a progressive P3 (see Chapter 3 for more discussion of progressive P3s) with qualifications-based selection of a P3 partner by the end of 2018 so as to accelerate completion of CEQA, permitting, and entitlements, and bring the project to completion at the earliest possible date. The district is also seeking to achieve an acceptable risk allocation with the private sector, reliable operations, effective maintenance, and optimized life-cycle costs.

Central Contra Costa County Sanitary District

The Central Contra Costa County Sanitary District is a special district providing wastewater collection and treatment for nearly 500,000 residents northwest of San Francisco. The District currently relies on imported natural gas for 90% of the power demand at its wastewater treatment plant. The greenhouse gas emissions from the plant hover around the threshold at which they would be required to offset emissions through California's cap and trade program. The District's new energy policy seeks to reduce those emissions, achieve net zero energy, and reduce energy costs. In May 2017, the District issued a Request for Interest to search for a private partner to design, build, finance, operate, and maintain a bioenergy facility that would supply renewable energy for most of the wastewater treatment plant's energy needs. The RFI received responses from eight teams, and the District has stated that it intends to issue an RFP after reviewing responses to the RFI.[50]

Santa Clara County Civic Center

Santa Clara County is considering various financing and delivery options for renovation and expansion of its civic center, which occupies 55 acres in the city of San Jose. The project would modernize the existing administrative, law enforcement, and judicial buildings in line with the county's master plan. The county authorized a mixed-use P3 on the civic center campus, issued an RFP in 2012, and in 2016 entered into a Master Development Agreement for the project with Lowe Enterprises.[51] The partnership would result in 1.15 million square feet of new county facilities in addition to the mixed-use development. The County is currently preparing an environmental impact report for the project.

LA Metro

The Los Angeles Metropolitan Transportation Authority (LA Metro) is in the early stages of perhaps the most ambitious P3 program in the country. The Office of Extraordinary Innovation (OEI) was established within the agency to catalyze adoption of new procurement approaches, partnerships, and technologies for improving mobility in the region. While LA Metro has enormous resources available to it with the passage of Measure M—the sales tax passed by LA County voters in 2016 that will provide $120 billion for transit projects over 40 years—there are still funding constraints, given the scale of the region's transportation needs. Finding ways to deliver projects more efficiently and with appropriate risk transfer in such a large capital program could produce numerous benefits. At the same time, LA Metro wants to accelerate projects because the benefits of Measure M are needed as soon as possible in order to provide residents with alternatives to existing traffic congestion.

OEI is leading a major change management process at LA Metro that will reshape business as usual throughout a large and complex organization. CEO Phillip Washington is driving this change, which is being implemented by OEI and the rest of the Metro staff. One of OEI's priorities is to develop public-private partnerships that can accelerate projects. Getting such a large organization to deliver projects differently takes time. Having a champion at the top with a clear vision of the benefits and challenges of implementing P3 is a major benefit. OEI is also educating staff and other stakeholders through P3 seminars with global experts and outreach to the board and labor unions.

While staff are beginning to identify projects for P3 delivery internally, LA Metro has primarily turned to the private sector to identify P3 opportunities through unsolicited proposals. LA Metro is currently moving forward with two major projects for P3 delivery, both of which came from unsolicited proposals. The West Santa Ana Branch is a new 20-mile light-rail project that would extend from Cerritos in southeastern LA county to downtown Los Angeles. The budget is $4 billion and the project was planned to be delivered in two phases; however, LA Metro believes that both phases can be delivered as one project through a P3. LA Metro is currently working on the draft Environmental Impact Statement/Environmental Impact Report and is assessing the feasibility of P3 delivery for the full project. An RFQ is possible sometime in 2019.

The second project is the Sepulveda Transit Corridor, which seeks to add a viable transit option to the heavily-congested I-405 corridor from the San Fernando Valley to the west side of LA and LAX. LA Metro is studying various high-capacity rail transit options for this project, which is expected to cost around $8 billion. The feasibility study is scheduled to conclude in the summer/fall of 2019. LA Metro plans to deliver this project through a Project Development Agreement (PDA) that would bring on a private-sector developer early in the process to help create a financially viable project. An RFQ for the PDA is expected in late 2018.

Huntington Beach Desalination

The proposed Huntington Beach desalination plant is a 50 MGD reverse osmosis facility that would provide a local, drought-proof source of water for 400,000 Orange County residents. The $625 million facility located on the site of a power plant is being developed by Poseidon Water. Like the Carlsbad Desalination Plant developed in San Diego county by Poseiden, the Huntington Beach project was first proposed in 1998 and has experienced development delays due to opposition from coastal environmental NGOs. In 2015, the Orange County Water

District board of directors approved a Water Reliability Agreement term sheet for the purchase of the facility's full 50 MGD capacity. The project received approval from the State Lands Commission in fall 2017 and is awaiting final approval from Santa Ana Regional Water Quality Control Board and the California Coastal Commission. Poseidon is optimistic that it will receive its final permits by mid-year 2019.

San Francisco Broadband

The City of San Francisco is in the early stages of a P3 procurement to develop a city-wide, fiber-based network for delivering Internet service. San Francisco worked with consultants to develop a blueprint for the system and assess delivery options in 2017, ultimately selecting P3 delivery for the network that, once completed, will be leased to retail service providers. The city expects to fund a portion of the project through milestone payments and to share the revenue with the P3 partner during the operations phase of the partnership. It is expected that the term of the construction and service agreement will be 15 years. The city issued an RFQ in January 2018 and short-listed three teams to bid in the RFP stage.

San Diego Association of Governments: Otay Mesa East Port of Entry and Downtown Bus Stopover and Multiuse Facility

The San Diego Association of Governments (SANDAG) is considering two projects for P3 delivery. The more advanced project is the Otay Mesa East Port of Entry. Since 2008, the agency has been considering options to create a tolled express point of entry to provide a faster border crossing option and reduce the economic losses from congestion and associated wait times. The State of California has already purchased the right of way and is building the road leading to the point of entry. SANDAG is currently working on an innovation analysis which will assess various designs and provide a preliminary estimate of traffic projections, project costs, and revenues. The agency is open to private sector involvement although there are complications associated with a cross-border project. Most notably, given that it is a border crossing, U.S. Customs and Border Patrol must provide staffing. National security will necessarily be the overriding concern, which makes it difficult to include contractual incentives that guarantee throughput. This situation does not preclude P3 delivery, but it does reduce the ability to transfer risk to a private partner during the operational phase as well as the ability of that partner to guarantee improvements in processing wait times.

The other SANDAG project with P3 potential is the proposed downtown San Diego Bus stopover facility to provide an off-street location where buses would park between runs. Currently, buses park curbside, reducing on-street parking. SANDAG has identified a preferred location for the facility and is in the process of acquiring the site. The agency is assessing P3 delivery of the project including the potential to incorporate the facility into a mixed-use development that also includes residential, office, and retail space.

Long-Term Opportunities

TJPA Transbay Program

The Transbay Joint Powers Authority (TJPA) was formed by the City and County of San Francisco and regional transportation authorities to design, build, finance, and operate an intermodal transportation hub in San Francisco. The Transbay Program has two phases. The first phase involves construction of the new Salesforce Transit Center, which is scheduled to be completed in the summer of 2018. Phase two involves extension of Caltrain and high-speed rail service into the Transit Center. Caltrain service currently terminates at the intersection of Fourth and King streets, and in Phase 2 TJPA will extend that rail service approximately 1.5 miles into the Transit Center in downtown San Francisco and build a new underground rail station at Fourth and Townsend. Funding dependent, Caltrain service into the Transit Center could start as early as 2027, while high-speed rail service into downtown San Francisco is scheduled to commence by 2029, according to the Draft 2018 California High-Speed Rail Authority Business Plan.

TJPA is in the process of assessing financing and delivery options for Phase 2 of the Transbay Program and is open to creative solutions that will accelerate the project, maximize innovation, and mitigate delivery risk. While P3 delivery is an option, there are also challenges. The 1.5-mile rail segment being developed by TJPA will be a

relatively small part of Caltrain's 52-mile line, and it may provide limited benefit to guarantee long-term operations and maintenance on only a small portion of the larger system. TJPA is considering several delivery options and is open for industry input and ideas on how the project can benefit from alternative delivery options. In June 2018, Bay Area voters approved Regional Measure 3, which raises tolls on state-owned bridges in the region to generate new transportation funding. The measure will provide $325 million for Phase 2, which could be sufficient to advance the project to shovel-ready status.

SR-37

California State Route 37, the 21-mile highway that extends from Vallejo in Solano county, through Napa and Sonoma counties, to Novato in Marin county north of San Francisco, experiences severe congestion during commute hours and is threatened by flooding as sea levels rise. Part of the highway was underwater for an extended period following the winter storms of 2016.

By 2050, rising sea levels could regularly submerge the roadway, and by 2100 it could be permanently underwater.[52] Since early 2017, Solano, Napa, Sonoma, and Marin counties have been working together with Caltrans and the Metropolitan Transportation Commission to study the options for SR-37, and a corridor study was completed in February 2018. There is a recognition that tolling is likely to be necessary, given that the four counties would need to pool available resources for 50–60 years to fund the project in the absence of tolling, by which time flooding would make portions of the road unusable.

The four counties along with Caltrans and the Metropolitan Transportation Commission recently started work on the Project Initiation Document, the precursor to the CEQA process, for Segment B of the project (the nine-mile middle stretch of the highway from Sears Point to Mare Island). This process will provide more specific costs for the estimated $1–2 billion project. No decisions on delivery or financing

Figure 9

The 2018 corridor study divides SR-37 into three segments reflecting current changes in the number of lanes: Segment A is a four-lane expressway, Segment B is a two-lane conventional highway, and Segment C is a four-lane freeway.

Source: Sonoma County Transportation Authority

have been made, and the agencies are prioritizing the environmental process at the moment, but P3 delivery is being considered for Segment B (one of three sections of the roadway) together with a range of other options. There have been proposals to toll the road in the past, including an unsolicited privatization proposal from United Bridge Partners. Regional Measure 3, approved by Bay Area voters in June 2018, will provide $100 million for the SR-37 modernization project, enough to fund a significant portion of the environmental work and prepare the project to be put out to bid. However, before an SR-37 P3 delivery could move forward, P3 enabling legislation for highway projects in California will be needed.

High-Speed Rail

California high-speed rail is an ambitious project that eventually aims to span 800 miles from Sacramento to San Diego with up to 24 stations. The most recent estimates put the cost of the San Francisco to Anaheim segment at $77 billion.[53] The 119-mile Central Valley segment of the project is currently under construction. The California High-Speed Rail Authority is proposing to complete that segment and environmental review for all remaining segments by 2022.[54] From the outset, an expectation of private participation has been built into the project's plan, addressing concerns that the level of public funding is insufficient to see the project to its completion. To attract private proposals, however, public investment in the core infrastructure is required.

In 2015, the California High-Speed Rail Authority issued a Request for Expressions of Interest (RFEI) to develop as a public-private partnership the "initial operating segment" of the project from Merced to Burbank. An RFEI typically does not initiate a formal procurement but rather is used to assess interest and solicit feedback from the private sector. Thirty teams from 10 countries responded to the RFEI.[55] While there was enthusiasm for delivering portions of the project as a P3, there were also concerns from the private sector. Most importantly, the lack of public funding sufficient to pay for the segment of the project subject to the RFEI was seen as a major hurdle. The estimated $31 billion price tag was also seen as potentially too large for a single P3. The Authority's *Draft 2018 Business Plan* notes that it is exploring P3 delivery for segments of the line, especially the Pacheco Pass tunnels which present significant cost and schedule risk due to their complexity.[56] In 2017, the German train operator Deutsche Bahn was awarded a contract to serve as "early train operator" for the initial phase of the project to link San Francisco with Bakersfield, assisting the Authority with planning, design, and implementation services that will serve to attract at-scale private investors.

Dumbarton Corridor Transit

The San Mateo County Transit District (SamTrans) is considering a range of options to improve mobility between Alameda county in the East Bay and San Mateo county and other parts of the Peninsula area south of San Francisco. There is growing congestion along the Dumbarton Bridge corridor stemming from the rapid growth of employment on the Peninsula and constrained housing options. SamTrans is considering a range of new bus and rail options to address these challenges, including new transit services utilizing the Dumbarton rail bridge. The rail bridge was originally built in 1910 but fell out of use and was damaged by a fire in the 1990s. There have been multiple studies and proposals for its rehabilitation over the past two decades, but none of them have advanced.[57] SamTrans, which owns the bridge, partnered with Facebook in 2016–2017 to study transportation options along the corridor. With its main campus neighboring the bridge and a desire to improve transportation options for its employees, Facebook funded the $1.2 million study. In June 2018, Facebook entered into a development agreement with SamTrans and Plenary Group to develop an improvement plan for the corridor.[58] SamTrans estimates that the project would cost approximately $1 billion. While it is still early in the process, it is possible that Facebook could privately finance a portion of the project and form a consortium to deliver it.

The Dumbarton corridor transit project could be indicative of a broader interest in transportation partnerships between private companies—especially large employers in the technology industry that are interested in improving access to their campuses—and public entities that are facing increasing infrastructure pressures. While it is unclear how the Dumbarton

corridor or other such projects would be delivered and financed, there could be an opportunity for procurement innovation and more significant public-private cost sharing in these partnerships.

Second Trans-Bay Tube

San Francisco Bay Area Rapid Transit (BART) District officials are in the early stages of studying a second Transbay tube for the portion of the rail system linking the East Bay and San Francisco. In 2018, BART officials approved a study of the project, which is expected to cost a minimum of $12–15 billion. The route of the crossing will be analyzed in detail, as well as opportunities to share its cost and use with high-speed rail and commuter trains such as Caltrain and Amtrak's Capitol Corridor. This could allow Caltrain to connect to the East Bay and Capital Corridor trains to extend into San Francisco. Other options, which have not been formally discussed, could allow access to the tube for commercial truck traffic, which could take trucks off already-burdened bridges and help generate revenue to support P3 development.

Decisions on whether and how to build the project are still years away. However, BART officials are tentatively aiming to have the second tube in service by 2030.[59] The existing tube is already approaching capacity, but modernization of the train control system and the purchase of 775 new train cars will increase the number of seats in the fleet by 60%, providing sufficient capacity through 2030. While specific delivery options are not yet on the table, BART has previously considered P3 delivery for parking, and there is interest in alternative procurement in parts of the organization. A project of this scale and complexity is well suited to P3, especially if the agency and its partners want to avoid cost escalation and meet the 2030 in-service target.

Water Reuse Projects

Water agencies throughout California are increasingly looking at water reuse for improving long-term water sustainability and diversifying local supplies, particularly in Southern California where local agencies want to reduce their reliance on imported water, whether from the Colorado River or the State Water Project. Many of these agencies purchase imported water from the regional wholesaler, Metropolitan Water District of Southern California, and they are concerned both about the sustainability of that supply and wholesale water rate increases over which they have no control.

Water recycling and reuse can provide a cost-effective, drought-proof supply of local water, and a number of agencies throughout the state are considering or actively pursuing projects. Currently, only indirect potable reuse is allowed in California, but direct potable reuse is being studied and could provide a more cost-effective reuse solution for water agencies. Many in the industry see this as a major P3 opportunity in the next 5–10 years, particularly given that many agencies have limited experience in procuring and operating these costly and complex projects. As the Santa Clara Valley Water District has concluded, it may make sense for agencies to shift the risk for such projects to a P3 partner that is better positioned to manage it.

California WaterFix

California WaterFix is one of the state's largest and most controversial projects. The State Water Project (SWP) and the Central Valley Project (CVP) deliver water from Northern California to millions of users across the state, including farmers and major population centers in the Bay Area and Southern California. One of the key challenges with these projects is movement of the water through the Delta. Currently, water is conveyed into the northern Delta from Northern California rivers and pumped from the south end of the Delta to Southern California. This presents several challenges. First, the pumping has serious impacts on the Delta ecosystem and the endangered species that inhabit it. Second, the 1,100 miles of levees within the Delta are vulnerable to earthquakes, rising sea levels, and saltwater intrusion, which put water supplies for millions of Californians at risk.

Solutions to this challenge have been in development for decades. The currently proposed project would divert water from the Sacramento River and deliver it through two 35-mile tunnels to state and federal pumping plants in the south Delta. It would also include environmental mitigation projects to improve the health of the Delta ecosystem. The project was originally intended to have two main tunnels, but after San Joaquin Valley farmers voted not to support it, there

was discussion of downsizing to a single tunnel, which would lower the estimated project cost from $17 billion to $11 billion. The Metropolitan Water District voted in April 2018 to take on a larger share of the project (65%, or $10.7 billion) to build both tunnels and potentially lease capacity to Valley farmers at a later date to recover the additional capital outlay.

California WaterFix would be funded by end users and is likely to be financed and delivered through traditional public means. It is currently envisioned that the WaterFix project will be managed under contract with the California Department of Water Resources through a proposed Joint Powers Authority made up of public water agencies involved with the project.[60] However, there have also been innovative proposals for alternative delivery and financing approaches, including delivering all or a portion of the project through a public-private partnership. There have been no formal assessments of that option, but the project is well suited to P3 delivery, given its size and complexity. With its cost overruns and delays, traditional delivery risks significantly higher costs and a longer timeline to completion.

Stormwater Projects

While both water and wastewater infrastructure haven't always been properly funded, stormwater infrastructure has been almost completely neglected in many places. Stormwater is a major source of water pollution, but it can also serve as a local water supply source if it is collected and treated. Part of the challenge has been with California law. Proposition 218, passed by voters in 1996, requires public votes for any new taxes or fees. Water and wastewater rate changes are exempt from public votes, instead requiring more than 50% of taxpayers or ratepayers to protest any fee or tax change related to those services. Stormwater fees were subject to a full public vote, making it much more challenging to pay for stormwater infrastructure. In October 2017, however, the governor signed SB 231, which defined stormwater as sewer infrastructure, opening the door for public agencies to establish stormwater fees and begin addressing runoff. Taxpayer groups have vowed to challenge any attempts to implement stormwater fees without public votes. This can be expected to slow, but not stop, the trend toward increased investment in stormwater infrastructure.

To address stormwater challenges, public agencies have a range of options, from traditional engineering solutions, such as diverting runoff to cisterns, to green infrastructure solutions, such as rain gardens, green roofs, and wetlands that can be distributed throughout urban landscapes to retain stormwater and recharge it into groundwater. These solutions can prove to be more cost effective than traditional gray approaches, and they provide other community benefits such as reduction in the urban heat island effect, improved air quality, and improved aesthetics. Public agencies on the East Coast have begun using public-private partnerships to implement green infrastructure programs: Maryland's Prince George's County, Chester, Pennsylvania, and DC Water have all used P3 contracts to shift risk to private partners for delivering, financing, and maintaining green infrastructure projects. While the former two are more traditional P3 contracts, the DC Water Environmental Impact Bond is short-term, tax-exempt financing that correlates investor returns directly to the water retention of the green infrastructure projects. These agencies are finding that green infrastructure P3s can reduce the per-acre cost of implementation and can dramatically lower the cost of complying with EPA consent decrees.[61]

As California cities and counties ramp up stormwater spending, there is an opportunity to reduce costs, accelerate delivery, and ensure long-term maintenance through P3 contracts. LA County is considering a parcel tax based on a property's impervious surface, which would fund a portion of the estimated $20 billion cost to comply with Clean Water Act regulations over the next two decades. The county and other public agencies with major runoff projects may consider the successful stormwater P3s on the East Coast as a model for reducing compliance costs and developing new local water supplies.

Sustainable Groundwater Management Act Implementation

California's Sustainable Groundwater Management Act (SGMA) was passed in 2014 to monitor and manage the state's groundwater resources. For many years, California was one of the few western states that did not regulate groundwater resources, which led to unsustainable consumption and declining groundwater

levels in many basins. SGMA's requirements are being phased in over time. The law required that Groundwater Sustainability Agencies (GSAs)—the entities responsible for managing a basin's groundwater resources in cooperation with local, county, and other partners—be formed in the state's high- and medium-priority basins by July of 2017. Those agencies are required to bring their basins into sustainability by 2040–2042.

SGMA implementation is still in its early phases, but over time GSAs will not only need to monitor and manage groundwater extraction but will also need to develop infrastructure to capture, transport, recharge, and store groundwater. New reuse and desalination facilities may be needed in some areas. The Groundwater Replenishment System, a partnership between the Orange County Sanitation District and the Orange County Water District, can treat and recharge 100 MGD of effluent into local aquifers per day. While not delivered as a P3, this is a large-scale example of the type of projects GSAs may need to implement in addition to significant new conveyance to move water to overdrafted groundwater basins. There is limited water available for recharge in many basins, especially in the Central Valley and Southern California, a situation that is likely to require new infrastructure to channel excess runoff from other areas into the major water delivery systems and deliver them to those basins.[62]

The GSAs are newly formed, with no experience in procuring and financing infrastructure projects or expertise in operating and maintaining the type of assets that will be needed. Some member entities of GSAs, such as irrigation districts, do have experience with procurement and asset management, but there is likely to be an overall shortage of the experience needed to deliver these projects. This makes them a natural fit for P3, where the private partner can assume the risk for designing, building, financing, operating, and maintaining water infrastructure while leaving ownership and control with local managers and communities. It is still too early to determine whether any GSAs will embrace P3 delivery, but it could be a significant opportunity as implementation of the SGMA evolves.

Watershed Protection & Restoration

Water suppliers are increasingly recognizing rivers, forests, and wetlands as important infrastructure assets alongside the treatment plants, pipes, and pump stations that make up their water systems.[63] Protecting and restoring this natural infrastructure is often a more cost-effective strategy than attempting to provide gray (i.e., built or "hard") infrastructure alternatives to replace the water treatment, flood control, and other services that ecosystems provide.[64] Cities such as San Francisco, Portland, Seattle, and New York have saved hundreds of millions of dollars by protecting their watersheds and avoiding the expense of building water filtration plants. Especially as climate change makes floods and droughts more frequent, and as more extreme weather exacerbates water quality challenges, water suppliers will be well served to invest in natural infrastructure assets.

There are a number of innovative investment strategies being developed across California to increase investment in natural infrastructure. The Pacific Forest Trust is working with state agencies and the California legislature to ensure that users of the state's water system contribute to the cost of repairing and maintaining natural infrastructure in key source watersheds, in addition to the dams, canals, and pumps. The revenue generated by surcharges would pay for conservation and restoration of critical forests, meadows and streams throughout the watershed on both private and public land. These projects could be financed through a combination of State Revolving Funds, Water Infrastructure and Innovation Act (WIFIA) loans, and tax-exempt revenue bonds and could be implemented by landowners on private lands and through traditional delivery on public lands. While not a true P3, the Pacific Forest Trust effort represents an innovative approach to bringing public and private parties together to invest in important water supply infrastructure.

The Forest Resilience Bond (FRB) being developed by Blue Forest Conservation(a public benefit corporation) resembles a traditional public-private partnership in its use of private financing to restore and maintain public forests and watersheds. Projects using FRB financing will reduce wildfire risk, protect water supply and downstream water infrastructure, improve air quality,

and create sustainable jobs in rural communities. Beneficiaries of the restoration work, such as the U.S. Forest Service, water and electric utilities, and state governments, will make cost-share and pay-for-success payments over time (up to 10 years) to provide investors with competitive returns based on the project's success. The Blue Forest team is pursuing an initial cohort of pilot projects that will be launched between 2018 and 2020. The initial pilots will be relatively small in size—in the range of 10,000 acres and $10 million raised per project—with a goal of scaling these up to larger projects in the same watersheds.

Climate Adaptation Projects

While the watershed protection and restoration projects cited above represent a distinctive strategy for adapting to climate change, there will also be a significant need to adapt, expand, and relocate the existing built systems that make up California's transportation, communications, energy, water, wastewater, flood control, and other infrastructure. There are numerous efforts underway to study and respond to the impacts that climate change will have on infrastructure throughout the state. The Bay Conservation and Development Commission (BCDC) is leading efforts in the Bay Area to assess and prioritize the region's vulnerabilities and to develop implementation and financing strategies, focusing in particular on how sea level rise will impact the transportation network and disadvantaged communities. BCDC is currently working to develop an assessment of vulnerabilities and implementation pathways by 2019. Implementation of the resulting projects will be led by agencies throughout the region. While the projects have yet to be defined, many involved in early-stage planning efforts, including the leadership at BCDC, believe that P3 can play a significant role in reshaping infrastructure to manage the impacts of climate change. This is a longer-range opportunity to watch.

3

Building a Stronger California P3 Market

California has been a P3 pioneer in the U.S. and has a significant number of projects in procurement and planning stages. But there is still more that can and should be done to build a robust P3 pipeline. Other states and nations are active in this field, and California must evolve its procurement processes if it is to maintain and build the infrastructure needed to support economic and population growth. This chapter highlights the procurement innovations, best practices, and policy reforms that can make P3 delivery a more effective tool for addressing California's long-term infrastructure challenges.

Procurement Innovations

The P3 model has evolved and diversified substantially over the past decade, driven in part by the innovative procurements and approaches demonstrated in the California partnerships highlighted in the preceding chapters. As the state continues to drive innovation in the market, there are a number of emerging trends in P3 delivery that provide state and local agencies with a diversity of tested procurement options to fit their projects. There are also valuable lessons learned from the past five years that can improve the efficiency and likelihood of success in future P3 projects.

P3 Offices and Programs

Historically, most P3s have been one-off projects—a single highway, building, or water system. In some cases such as UC Merced, a public entity has bundled numerous buildings together into a single procurement, but few organizations have implemented a sustained shift toward P3 delivery on the scale that has occurred internationally. Recently, a number of public agencies in the United States have established P3 offices or programs that are working to attract and implement a range of projects. Denver and Washington, D.C. have created such offices. In California, the most notable example is the Office of Extraordinary Innovation within LA Metro.

A broader P3 program may not be justified in all public agencies, especially in smaller organizations with a limited number of large capital projects, but there can be substantial benefits for agencies that have complex large-scale infrastructure needs. First, given the wide range of people and functions involved in a complex procurement, it can be challenging to make widespread changes to well-established institutional patterns and processes. Internal resistance to such changes can slow or derail P3 projects. Having a group dedicated to coordinating across multiple functions, breaking down silos, and ensuring project success can overcome barriers in advance of a specific project. Having a dedicated P3 office and undertaking a series of P3 projects also allows a public agency to build the capacity to execute transactions and avoid the public-sector mistakes that often result in project delays and cost overruns. The competencies required to procure a P3 (financial, risk structuring, risk management) are different from the

skills required in traditional procurements (construction management, engineering). Building P3 skills and transactional capacity reduces the learning curve and costs of each subsequent transaction.

A dedicated P3 office or program can also send important signals to the private sector and the broader public. It signals to the private sector that the public agency is serious about developing real projects and won't abandon a project partway through the procurement. This improves the likelihood that the public agency will attract high-quality responses to its procurement requests. A concerted shift toward broader P3 procurement also provides the public agency with a greater opportunity to educate the public on the benefits of P3 ahead of a particular project, dispelling common myths and emphasizing instead the value P3 can deliver to taxpayers and ratepayers.

Unsolicited Proposals

Unsolicited P3 proposals are a way for the private sector to formulate and submit project concepts that they identify as a good fit for P3. A public entity's legal authority to engage with an unsolicited proposal varies based on each state's legislation, but in theory a public entity could choose to reject the proposal outright, adopt the concept and initiate a procurement, or accept the proposal and enter directly into negotiations with the proposing entity. Unsolicited P3 proposals are a relatively new concept in the U.S. and have not been widely used to date. The most active unsolicited programs are in Washington, D.C., Los Angeles (LA Metro), Pennsylvania (PA Department of Transportation) and Puerto Rico. Denver is also formulating an unsolicited proposal policy as it develops its P3 office.

There are differing views on the best approach to engaging with unsolicited proposals. LA Metro's Office of Extraordinary Innovation sees its unsolicited proposal program as a way to source projects the private sector will actually be interested in delivering, rather than spending resources on developing procurement requests that may not receive robust responses. After deciding that an unsolicited proposal is worth pursuing, LA Metro plans to begin competitive procurement processes for each project. The private sector is often willing to spend the time and resources to propose a project that will require a competitive procurement in order to have the opportunity to win the project even if selection is uncertain. In some cases, where the public entity can demonstrate that there is no benefit to a competitive procurement—for example, because there are no other providers capable of delivering the project—it may be more cost-effective to directly enter into negotiations with the proposer, although the public entity must ensure that it has adequate cost protection, transparency, and support from experienced advisors.

Progressive P3

Historically, most capital project procurements have involved some element of price competition within the selection process. Respondents to an RFP produce some level of design and a bid for completing the design work or construction of an asset. While still a relatively small percentage overall, there are an increasing number of "progressive" procurements both for P3 and design-build deliveries. In a progressive design build (PDB), the procuring authority makes a selection based on qualifications, choosing the team that is best positioned to deliver the project based on the firm's track record of success and key personnel. Once selected, the PDB team progresses through various stages of design in close consultation with the public partner, using a transparent cost build-up and risk register that is vetted for reasonableness by a third party advisor. Many of the construction scopes are bid out, leaving space for substantial competition within the process. A progressive P3 combines progressive design build with the finance, operations, and maintenance scopes involved in regular P3 delivery.

There are several reasons why public agencies might choose to use progressive processes. First, it requires significant time and expense to prepare for a hard bid procurement. The project must be sufficiently defined so that respondents have the detail needed to produce an accurate bid. Second, once the agency has selected a bid, it loses some degree of control over how the project is designed from that point. Substantive client-driven changes can result in costly change orders once a bid is accepted. A progressive process provides greater opportunity for collaboration throughout the design process. Third, while a hard bid P3 provides greater up-front cost certainty, because bids are submitted

before design is complete, bidders' prices typically have built into them a significant contingency (an amount added to the estimated hard costs of the project that reflects the uncertainty inherent in committing to a price before design is complete). If a hard bid project does not use all of the contingency, the private partner keeps that money. In a progressive process, the selected team continues to reduce contingency as design advances until the guaranteed maximum price is set, reducing contingency typically from 8–10% in a hard bid to 3–5% in a progressive process.

In general, a hard bid process works best for well-defined projects with key components sufficiently resolved so that the private partner does not need to include excessive contingency in its bid. Projects that are less well defined and require significant public input in the remaining design or are at risk for major changes during the procurement are generally better suited to progressive procurements. For example, if an airport terminal project is procured as a hard bid but a major airline drops out partway through, it would be costly and challenging to redesign the project after a team has been selected based on its bid for a fundamentally different project. Or if a design meets contractual performance standards but does not appeal to the public, the resulting change orders can be expensive. One way for the public to avoid this outcome is to hire an expert representative that can interface with the design team and ensure that the project aligns with the public's goals as is being developed.

There are also challenges in progressive processes that, if not addressed up front, could result in the public sector not receiving the best value for money. Many in the industry emphasize the importance of maintaining competitive tension in a procurement as long as possible. It is widely believed that the public loses leverage once a process is narrowed down to a single team. In a progressive process, the public by definition gives up this leverage at the start in exchange for the other benefits described above. Competitively bidding all subcontractor scopes can retain a significant element of competition within each component of construction, although not at the top contract level. Earlier involvement may allow the private partner greater flexibility to innovate in the design. However, this depends on whether the public partner is open to such innovation.

The most essential element of a progressive process is building a strong foundation of trust that can carry through to the project's delivery. Without this trust foundation, the inevitable changes in cost and risk allocation that occur during the progressive process will create conflict. Key to this trust is an early effort to align objectives, set expectations, and agree on key decision-making processes. Another key is a third-party facilitator who can run partnering meetings on a regular basis to set goals, review progress on previous commitments, and address issues as they arise. Finally, engaging expert technical advisors on the public side to review the progressive cost build-up and ensure that all elements are in line with market prices can build trust with the public.

Public Staffing and P3 Team Interaction

Each P3 is unique, and the procurement and contract should be structured to meet the public sector's project-specific goals. However, there are a number of traits that characterize successful P3 projects. One common factor is the presence of a senior, high-profile public champion for the project who can help it weather the inevitable political challenges. Senior leadership should be ideally supported by a dedicated public-sector implementation team that interfaces with the private partner and cultivates support throughout the organization. Any time a large organization with ongoing responsibilities undertakes something fundamentally new, there can be internal resource challenges and/or inertia associated with existing culture and organizational practices that may impede the adjustment to new processes. Forming a dedicated team, which is trained and incentivized to move the project forward and is empowered to make needed adjustments to internal practices, will greatly improve the chances of project success. Relying on a mix of staff that retain ongoing responsibilities and demands from their other spheres makes implementation more challenging.

Supporting staff resources with the right outside consultants is also important. While there is a wide range of advisors offering P3 expertise, relatively few have a demonstrated track record of successfully advancing projects to financial close, and an even more select pool have played an integral role in moving prominent P3 projects to close in California.

Once a partner is selected, the ongoing governance structure is of central importance. It is crucial to set objectives and establish a shared decision-making framework at the outset of the project. Though it may sound soft in the context of hard asset infrastructure delivery, the preemptive time and focus that all parties commit to the intensive establishment of shared outcomes, open-book implementation practices, and expedited decision-making roles and protocols cannot be overvalued. A dedicated launch workshop or workshops following selection can establish a partnership foundation that accelerates decision-making, aligns execution, and expedites trouble-shooting among all the parties for the life of the project. Regular meetings, clear communication protocols, and even a third party facilitator can be beneficial to ensuring effective interactions between the public and private teams throughout project delivery.

Stakeholder Engagement

The P3s completed in California over the past 5 years demonstrate an increasing focus on early and ongoing engagement of the broader stakeholder community affected by a P3 project. This reflects a growing sophistication among public agencies in understanding the importance of building a process that can withstand the inevitable political challenges. These projects demonstrate the importance of consulting with staff, elected decision makers, the public, labor unions, and other key stakeholders, before the project begins to identify obstacles, and educating them on the need for the project and the value of the P3 delivery. Numerous projects have gone to procurement only to fail along the way due to objections from public sector unions, internal political struggles, public misunderstanding or opposition, or disagreements with other agencies. Among the examples are the cities of Fort Worth, Texas, and Columbia, South Carolina, which issued RFQs for water and/or wastewater P3s, only to pull them back after issuance. This kind of inconsistent approach can be damaging to those cities' and to other cities' abilities to procure projects in the future, as the private sector may no longer take those procurement requests seriously. Successful projects such as UC Merced anticipated potential challenges early in the process, educated key constituencies, held numerous workshops with the public, and engaged with labor unions to develop an O&M scope that would be mutually beneficial.

The projects described in the previous chapters also demonstrate that it is crucial to engage other public agencies that play a major role in approving or managing the project. A clear example of this is the Presidio Parkway, which required particularly complex coordination with numerous agencies. This led to significant project delay and lawsuits, although the highway portion of the project was still delivered on time and on budget. Public sponsors should carefully detail project outcomes and working processes for any projects that span multiple jurisdictions with associated governance complexity.

Value for Money Analysis

Value for Money (VfM) analyses are typically conducted prior to a P3 procurement to compare the costs and risks of P3 delivery to those of alternative approaches such as design-bid-build or design-build. While VfM analyses are useful in establishing a high-level understanding of the value P3 delivery brings (or does not bring), they can also be a source of disagreement and project delay. Especially where there are internal political disagreements over the delivery strategy, the VfM analysis is often the primary focus of the conflict, with proponents of P3 arguing for one set of assumptions and opponents arguing for another. Such conflicts tend to arise primarily at the very early stages of a procurement, when project scope and risks are not adequately defined.

There is increasing recognition that while VfM analyses are an important step in assessing delivery options, they should not be the only or even the primary decision-making tool when evaluating a P3 project. It is far more useful for a public sponsor to understand the overarching reasons for doing a P3 (e.g., limited experience with a given activity or technology, project acceleration, etc.) and educate stakeholders on those key drivers in order to achieve consensus on the desired outcome.

Procurement and Contract Best Practices

Increasingly, public agencies are issuing Requests for Information, Requests for Expressions of Interest, and Requests for Qualifications at an early stage in order to solicit feedback from the private sector on how to best define a project and to assess interest from potential partners. There is value to early interaction with the market, but a project must also be well enough defined to issue an RFI or RFQ. When a public sponsor issues an RFI on a highly undefined project, it is unlikely to get useful answers from the private sector, receiving instead answers that begin with "It depends…."

Once the public agency is prepared to issue a Request for Proposal and select a team, it should focus on outcomes and performance criteria rather than the specification of particular technologies, materials, or capital sources. Cost savings generated through innovative design collaboration between all parties are dependent on the owner not being overly prescriptive with its preliminary designs, thus allowing sufficient scope for innovation and ultimately enabling the selected P3 partner to bring innovative concepts to the project. Similarly, the public agency can benefit from focusing on life-cycle project costs throughout the process, rather than any one cost element in isolation. To this end, it is beneficial for all parties to allow short-listed teams to preview the RFP and provide feedback to the sponsor prior to issuance, so that they can identify ways to encourage innovation on both acceleration and life-cycle cost.

In the contractual phase, while there are numerous best practices that help deliver value for the public, a central goal of the contract should be to ensure that the public is effectively transferring the risk that it is paying for to the private partner. A common criticism of P3 projects is that they have not really shifted significant risk to the private sector. The public sponsor should work with its advisors to develop specific, enforceable Key Performance Indicators (KPIs) with defined penalties for underperformance, in order to ensure that the private party is held accountable for asset performance over the life of the contract. Remedies for underperformance, from minor penalties up to default and public take-over of the project, should be clearly outlined.

Enhanced Infrastructure Finance Districts

Enhanced Infrastructure Finance Districts (EIFD) contain a range of powers that allow one or more public entities to finance infrastructure projects. The districts can be established by one or more cities, counties, or special districts and managed under Public Finance Authorities (PFAs) governed by boards appointed by the founding agencies. PFAs develop an investment plan which can be funded by a range of funding streams as long as they do not constitute a tax. This can include tax increment from land value increases, assessments, fees, and federal, state, and private funding streams. PFAs have the authority to deliver and manage infrastructure projects through P3 arrangements.

EIFDs are sometimes viewed as a successor to California's redevelopment program, which allowed cities and counties (to a lesser extent) to capture the growth in property tax from agencies that provided services in the area designated for investment. The primary source of revenue for redevelopment was from school districts. Since the property tax from most school districts is part of the state school finance system, this was revenue that was diverted from the general fund. That explains why Governor Brown and the Legislature ended the practice in 2011, in order to provide more long-term funding to local governments and to address short-term state budget deficits.

EIFDs have similarities but also have significant differences from redevelopment. While they allow municipalities to use tax increment financing (growth in the property tax) for capital improvements, they are unlike redevelopment because cities can only capture the proportion of the property tax increase that belongs to them already. They can use the increment that belongs to parties that are participating on the board, with the exception of schools. EIFDs also make it easier to procure infrastructure across multiple jurisdictions. The statute simplifies the process of establishing and governing a multi-jurisdictional agency, encouraging cities, counties, and other entities to collaborate on projects that benefit a wider geographic area.

Three EIFDs have been formed to date but have not proceeded to implementation, so it is not clear whether

they will use their public-private procurement authority. West Sacramento is using an EIFD to redevelop a 4,000 acre area, implementing a range of transportation and other improvements to spur investment and new housing.[65] The City of La Verne, east of Los Angeles, established an EIFD to revitalize blighted portions of downtown around a planned light-rail station. That EIFD's Infrastructure Financing Plan identifies 14 projects at an estimated cost of $33 million.[66] Finally, the City of San Diego formed an EIFD in February 2017 to accelerate infrastructure improvements in the Otay Mesa area in the southern part of the city. The $1.2 billion in projects there are focused primarily on transportation and parks.[67]

EIFDs could be a useful tool in combination with P3 delivery. Their cross-jurisdictional aspects could help address the state's multi-jurisdictional infrastructure needs, particularly in smaller communities that don't have the capacity or funding to undertake large projects on their own. A P3 entity could, for example, address the water challenges among smaller Central Valley communities through an EIFD that brings new infrastructure and treatment solutions to multiple towns at once. This could bring a project to a scale that would interest private P3 partners and could spread the fixed costs of building and operating a system across more homeowners so as to improve affordability. An EIFD could also be used to deliver Long Beach Civic Center-style transactions in which private development subsidizes P3 delivery of public infrastructure projects. In that case, the Public Finance Authority governing an EIFD could procure infrastructure improvements from a P3 partner, using tax increment revenues as a portion of the funding stream for an availability payment.

Policy Reforms

California has a growing P3 market, especially in the social infrastructure space, that will likely continue even in the absence of major policy reforms at the state or federal levels. P3 could play a larger role in meeting the state's infrastructure needs, however, and the following reforms would help unlock that potential.

State-Level Authorizing Legislation

The most commonly cited state-level policy reform is broad P3 enabling legislation, most notably for highway projects. As discussed in Chapter 1, the most recent enabling legislation for highway projects expired in January 2017. Currently, Caltrans and regional transportation agencies are not authorized to enter into P3s for highway projects. New enabling P3 legislation has been strenuously opposed by a public sector union, Professional Engineers in California Government (PECG), which also aggressively fought the Presidio Parkway project with a lawsuit that added to costs and delayed the project for a year.

At this writing, enabling legislation has been introduced in the state legislature but has not advanced.[68] Some projects described in Chapter 2, such as SR-37, will not be able to move forward as P3s without that legislation, and Caltrans and many regional agencies are not currently considering new P3 projects due to the lack of authorization. While appropriate transparency and public-sector protections should be built into any enabling legislation, a single group's interests should not preclude the entire state from having the option to choose the procurement approach that can deliver critical infrastructure projects most cost-effectively and efficiently.

Many in the industry, particularly in the public sector, see a potential benefit in clarifying the California Infrastructure Finance Act (California Government Code Section 5956) which authorizes P3s for local government agencies on fee-producing infrastructure. The broad authority provides valuable flexibility to local governments, but the lack of specificity can also create uncertainty within public legal offices and a perception that using Section 5956 may present legal risks for a procurement. Including additional specificity could alleviate such concerns.

While previous attempts to enact broader P3 enabling legislation at the state level have met with significant opposition, primarily by public-sector unions, legislation authorizing individual P3 projects has been successful on a number of occasions. Until more comprehensive legislation is passed, projects may therefore need to rely on individual legislative vehicles to move forward.

State-Level CEQA Reform

The California Environmental Quality Act (CEQA)—signed into law by Governor Ronald Reagan in 1970—requires state and local agencies to study the environmental impacts of their activities and take feasible steps to reduce those impacts. In most cases, a public agency completes its environmental impact review prior to beginning a P3 procurement. Thus, CEQA typically does not directly delay a P3 partner's project delivery, but it does frequently lead to delays in the public sector's ability to advance a project to the point where it can issue an RFQ or RFP.

While CEQA serves a valuable purpose in protecting the environment, streamlining the process is one of the most significant steps California could take in order to bring more projects—using any procurement method—to market and to address the state's critical infrastructure investment shortfall. While a full discussion of CEQA reforms is beyond the scope of this report, easing CEQA requirements for certain types of projects such as renewable energy and infill development, or limiting the number of lawsuits that can be brought against projects that have received CEQA approval and have met mitigation requirements, could accelerate project delivery significantly. Because of political challenges, there is currently little appetite for substantive CEQA reform. In the absence of legislative action, local agencies could reduce CEQA costs by combining multiple similar projects into a single programmatic EIR (e.g., to cover water reuse projects in a particular geography).

State-Level Public-Sector Resources

One open question for California is whether the state could benefit from a center of excellence that can support public agencies in pursuing public-private partnerships. In the wake of the recession, many public agencies have experienced significant decreases in planning staff and resources, making it more challenging for them to lead a complex procurement such as a P3. Organizations such as Partnerships BC in British Columbia have been instrumental in working with public agencies in the province by providing expertise and resources for developing P3s. To date, Partnerships BC has been involved in 52 projects totaling $18 billion in capital investment, and in many cases it directly manages the procurement for public entities. It has also developed standardized RFP documentation, driving down the public transaction costs from millions of dollars per transaction to hundreds of thousands of dollars. In the U.S., transportation-specific state P3 offices have been established in Colorado and Virginia.

Given the size of California's economy and the state's infrastructure needs, a similarly-styled agency capable of leading project delivery on behalf of other public entities is unlikely, as the funding and resources needed to staff such an agency would be considerable. However, creating a smaller office within an existing agency, such as the California Infrastructure Bank, could be a valuable and cost-effective approach that provides standardized procurement documentation, skills transfer to public entities pursuing P3 procurements, and vetting of third party advisors that are skilled in moving projects to financial close.

There have been previous attempts to create this type of office in California. The Public Infrastructure Advisory Commission (PIAC) was established in 2009 to advise the State, the California Transportation Commission, and regional transportation agencies on project selection and to provide guidance on best practices. The impact of PIAC was limited due to its narrow mandate, its reliance on volunteer commissioners rather than a dedicated professional staff, and the shortage of transportation P3s. However, an adequately staffed cross-sector agency with P3 expertise could prove to be a cost-effective source of support and guidance for public agencies considering and implementing partnerships.

Another way the state could build a stronger project pipeline is by providing limited funding for the predevelopment phase of capital projects over a certain size. Many desperately needed infrastructure projects experience delays or fail to move forward due to a lack of public resources and expertise in the predevelopment phase where asset management planning, feasibility studies, and rate studies are needed to guide decision-making. To incentivize and fund the early, highest-risk stage of project development, the legislature could

consider creating a revolving hybrid grant/loan program that is modeled after a private equity approach. A program of this type could be housed in an existing agency with relevant experience such as the California Infrastructure and Economic Development Bank, which already has expertise in providing expedited review of project proposals.

Under such a program, the governing agency would provide incentive grants and low- or no-interest loans to fund early design and engineering, financial feasibility, and stakeholder engagement. The proposed program could fund projects in a wide range of sectors including projects related to climate adaptation. The project sponsor would be required to advance the project according to a defined project schedule. Funds would be disbursed progressively as the public entity meets plan milestones. If the public entity self-performs a project, it would repay 100% of the grant from project funds once the project is financed. If the public entity adopts an alternative method of procurement that involves private capital, the private project developers would be responsible for repaying 2 times to 3 times the grant amount to the state at financial close. In the event that the public entity fails to advance the project in accordance with the agreed-upon timeline, it would be responsible for repaying 50% of the grant from its own funds.

Finally, a reform that has not been widely discussed but should be considered would require that public procurements that receive state funding and exceed a certain cost threshold (e.g., $50 million) provide a high-level analysis of life-cycle project costs, including consideration of alternative delivery approaches and long-term funding of project maintenance. This would directly address a major failing of many large public projects where maintenance costs are not budgeted, resulting in degraded assets and higher long-term costs to the public. This requirement would codify and build on Governor Brown's executive order on life-cycle cost accounting.[69] Such projects might also include a high-level analysis of long-term climate change impacts in order to ensure that major investments continue to deliver intended benefits even as long-term climate patterns shift.

Federal-Level Tax-Exempt Financing

The most significant step that the federal government could take to advance P3 projects in California and around the country is to level the playing field on the cost of debt financing in P3 projects. One of the primary reasons that P3 has expanded more rapidly in Canada and Europe is that public entities in those geographies do not have access to tax-exempt financing. Many public agencies in the U.S. do not consider P3 delivery because they believe the P3 option is more costly due to the lower cost of capital that comes with tax-exempt financing (but not taking into account the savings from accelerated delivery and life-cycle O&M). If an infrastructure project is owned by a public entity and provides public benefit, it should be eligible for the same financing incentives regardless of how it is delivered.

There are several low-cost federal financing programs that can currently be integrated into P3 projects. Private Activity Bonds (PABs), Water Infrastructure Finance and Innovation Act (WIFIA) loans, Transportation Infrastructure Finance and Innovation Act (TIFIA) loans, and the State Revolving Funds (SRF) all provide below-market-rate debt that can be integrated into certain types of partnerships. These are valuable programs, and expanded funding would be a low-cost way for the federal government to reduce project costs and promote more performance-based procurements, especially if the application processes are streamlined to minimize the time and expense of accessing the financing. However, these programs have limited availability, only apply to certain types of projects, frequently have complex and time-consuming application processes, and in the case of PABs are more expensive than traditional tax-exempt financing. A broader expansion of tax-exempt financing would greatly expand the adoption of alternative financing structures.

There have been a wide range of proposals to expand existing financing programs or create new instruments that would level the playing field on the cost of capital for P3 projects. The Trump Administration has proposed eliminating the Alternative Minimum Tax (AMT) for PABs,[70] lifting the state volume cap[71] for "public purpose infrastructure projects" and the nationwide volume

cap for transportation projects, and expanding the types of projects eligible for PABs.[72] The plan has also proposed the provision of additional budget authority for TIFIA, WIFIA, and the Railroad Rehabilitation and Improvement Financing programs. Previous proposals, such as the Obama Administration's Qualified Public Infrastructure Bonds, would have accomplished many of the same goals (eliminating volume cap, removing the AMT penalty, and expanding tax-exempt financing to more projects) albeit under a new program. Regardless of what the program is called, providing expanded tax-exempt financing without an AMT penalty for a broad range of P3 projects serving public uses should be a goal for Congress as it considers how to accelerate infrastructure investment. This includes making public buildings developed using P3 methods eligible for Private Activity Bonds, as proposed in the Public Buildings Renewal Act of 2017 (H.R. 960/S. 326).[73]

The other tax exemption challenge for P3 projects is the treatment of outstanding tax-exempt debt previously issued by a public entity. In certain P3 arrangements, existing tax-exempt debt must be refunded at financial close, which can be very costly. If those bonds are recently issued and not callable until ten years after issue, the cost of refunding them can be prohibitive and can make a P3 uneconomical for a public entity that might otherwise benefit from transferring risk to a private partner. Under certain circumstances, existing tax-exempt debt may be left outstanding under "safe harbor" provisions. The IRS recently introduced new safe harbor procedures which made it easier to preserve tax exemption on outstanding debt.[74]

Under the new procedures, a service provider may hold a contract for up to 30 years or 80% of the life of the asset, as long as the contract does not provide the private party with a share of net profits and the public retains significant control of the managed property, among other requirements. The Trump Administration's infrastructure plan would extend the term of the contract to 95% of the asset life and provide additional remedial action to preserve tax-exemption in the case that a project does not qualify for safe harbor procedures. Additionally, clarifying that safe harbor procedures apply to availability payment P3s and removing any fixed-year (e.g., 30-year) term limitation would be beneficial. These changes would make P3s available to a wider range of public entities that may otherwise find a partnership infeasible due to existing debt.

Federal-Level Flexibility and Incentives for P3 Projects

The federal government could implement a range of measures to incentivize P3 projects, from new funding programs to accelerated approvals. There should be a particular focus on accelerating and incentivizing projects that move quickly to financial close and secure necessary funding. Rewarding state and local agencies for timely decision-making, effective project development, and procurement innovation could significantly expand the P3 pipeline in California. This could be paired with predevelopment assistance in the form of technical assistance or grant funding for feasibility analyses and procurement development for disadvantaged communities or agencies that might not otherwise have the resources or expertise to pursue P3 projects.

The Trump Administration's infrastructure plan includes a number of proposals of this nature that could benefit the California P3 pipeline. The Infrastructure Incentives Program would create new federal grant assistance for projects that incorporate non-federal revenue and utilize innovative delivery approaches that improve efficiency in project delivery and operations. Projects would be required to meet specific milestones and would forfeit the grant funding if they are not met within two years. The plan also proposes to provide greater flexibility for projects with a de minimis federal funding share. While little detail is available, the plan proposes to streamline the review and approval of non-federally-funded projects to the extent that they fall under the jurisdiction of federal agencies. It also proposes additional flexibility, such as the ability to begin utility relocation prior to National Environmental Protection Act (NEPA) approval. Combined with state level reforms, these and other federal efforts could significantly accelerate the delivery of public projects that have secured needed funding and are otherwise ready to proceed.

Conclusion

California's future is bright but requires a clear commitment to more effectively building and maintaining the infrastructure that makes the state an attractive place to live and work. This is a critical time for California's infrastructure; continuing to defer hard decisions will only pass the costs on to future generations, leaving them with a less robust economy than if the state makes prudent investments now. Decision makers at all levels of government should consider how they can remove barriers and create incentives to spur needed investments. Encouraging more widespread adoption of performance-based approaches such as public-private partnerships, where appropriate, is one part of this path forward. More broadly, policy makers and public agencies should embrace life-cycle management strategies for infrastructure assets, account for long-term maintenance in project budgeting, and consider how today's investments will fare in a changing climate.

This report demonstrates how California has pioneered new approaches to infrastructure delivery in the U.S. and is continuing that tradition with a new generation of projects. Whatever terminology is chosen—public-private partnerships, alternative procurement, or performance-based infrastructure—these partnerships can accelerate delivery and optimize life-cycle cost, demonstrating to taxpayers that their dollars are being invested and managed wisely. The challenge for the public sector is not to minimize or maximize private-sector involvement, but instead to ask how the public can get the most for each dollar invested; private partnerships won't always be the answer, but where they do fit, the public and the state can reap important long-term benefits.

The best practices and policy reforms highlighted in this report are a starting point for California's path forward on infrastructure. Moving toward a future where the public and private sectors can collaborate more effectively to make the investments the state needs in a timely and cost-effective manner will require a cultural shift at all levels, but it is a challenge worth embracing.

Appendix

Annotated Bibliography on Procurement Performance

Publication: Love, P.E.D., et al. "Cost Performance of Public Infrastructure Projects: The Nemesis and Nirvana of Change Orders." *Production Planning & Control,* 2017. https://epublications.bond.edu.au/fsd_papers/514/.
Findings: The study examined 67 projects—from a wide range of sectors, using a range of procurement methods (but not P3), and completed between 2011 and 2014—and found an average cost overrun of 23.75%. Cost overruns ranged from -43% to 271%. There was no significant difference in cost overruns for the various publicly financed procurement methods. The study found that change orders still occurred in DB procurements.

Publication: Terrill, M. and L. Danks. *Cost Overruns in Transportation Infrastructure Projects.* Melbourne: Grattan Institute, October 2016. https://grattan.edu.au/wp-content/uploads/2016/10/878-Cost-overruns-on-transport-infrastructure.pdf.
Findings: The study surveyed 836 traditionally-delivered Australian transportation projects with a value greater than $20 million, all completed since 2001. Overall, projects came in 24% over budget. However, 90% of the cost overruns were explained by 17% of the projects which overran the initial budgets by more than 50%. Cost overruns are likely understated, as there was limited data for 68% of projects where no early-stage cost overruns were assumed.

Publication: Ramsey, David W. and Mounir El Asmar. "Cost and Schedule Performance Benchmarks of U.S. Transportation Public-Private Partnership Projects: Preliminary Results." *Transportation Research Record,* Vol. 2504, 2015, pp. 58–65. https://asu.pure.elsevier.com/en/publications/cost-and-schedule-performance-benchmarks-of-us-transportation-pub.
Findings: This paper reviewed 25 P3 projects completed in the U.S. from 1995 to 2013, ranging in cost from $18 million to $2.1 billion. There was average cost growth of 3.22% and average schedule growth of 1.2%. The authors found this to be superior to traditional cost and schedule overruns associated with DBB projects.

Publication: Baccarini, David and P.E.D. Love. "Statistical Characteristics of Cost Contingency in Water Infrastructure Projects." *ASCE Journal of Construction Engineering and Management,* Vol. 140, Issue 3, March 2014. https://ascelibrary.org/doi/abs/10.1061/(ASCE)CO.1943-7862.0000820.
Findings: The study reviewed 228 traditionally delivered and financed water infrastructure projects in Australia. The authors found an average cost contingency of 8.46% and an average additional cost overrun of 5.12%. Cost overruns due to changes in scope were not included. The authors found that the typical cost contingency in water projects is not sufficient to cover final project costs. If sponsors wish to have a 90% probability that the budget will cover final costs, a contingency of 16% would be required on average.

Publication: Government Accountability Office. *VA Construction: Additional Actions Needed to Decrease Delays and Lower Costs of Major Medical-Facility Projects.* GAO-13-302. April 2013. https://www.gao.gov/assets/660/653585.pdf.
Findings: For major traditionally delivered and financed medical center construction projects, the GAO found cost increases ranging from 59% to 144%, with an average overage of $366 million. Delays ranged from 14 to 74 months with an average delay of 35 months.

Publication: Infrastructure Partnerships Australia. *Performance of PPPs and Traditional Procurement in Australia.* November 1, 2007. http://infrastructure.org.au/wp-content/uploads/2016/12/IPA_PPP_FINAL.pdf.
Findings: This report reviews 21 P3 projects and 33 traditional projects. The cost overrun was 1% for P3 projects and 15% for traditional projects. P3s were found to be completed 3.4% ahead of time on average while traditional projects were completed 23.5% behind schedule. This was particularly pronounced for larger projects.

Publication: Chasey, Allen D., William E. Maddex, and Ankit Bansal. *A Comparison of Public-Private Partnerships and Traditional Procurement Methods in North American Highway Construction.* Arizona State University, March 15, 2012. http://www.pwfinance.net/document/research_reports/3%20TRB%20P3%20study.pdf.
Findings: This paper reviewed 12 large-scale (greater than $90 million) P3 highway projects and compared performance with research on DBB and DB projects. For P3 projects, cost overruns averaged <1% and schedule overruns averaged -0.3%. For DBB projects, cost overruns averaged 13% and schedule overruns averaged 4%.

Publication: Cantarelli, C.C., B. Flyvbjerg, and S.L. Buhl. "Geographical Variation in Project Cost Performance: The Netherlands versus Worldwide." *Journal of Transport Geography,* Vol. 24, September 2012, pp. 324-331. https://www.sciencedirect.com/science/article/pii/S0966692312000774.
Findings: The study examined 806 traditionally delivered and financed projects worldwide and found that the average cost overrun ranged from 19.8% to 35.5% depending on the type of project.

Publication: The Conference Board of Canada. *Dispelling the Myths: A Pan-Canadian Assessment of Public-Private Partnerships for Infrastructure Investments.* January 2010.
Findings: This report reviewed 55 projects in the "second wave" of Canadian P3s, including projects in the health care, transportation, social infrastructure, and water sectors. The study found that P3s in Canada performed better than traditional delivery methods, producing cost savings ranging from 0.8% to 61.2%.

Publication: National Audit Office. *Performance of PFI Construction.* October 2009. https://www.nao.org.uk/wp-content/uploads/2009/10/2009_performance_pfi_construction.pdf.
Findings: This NAO report reviewed 114 UK projects across all sectors. The NAO found that 69% of P3 projects delivered to the contracted timetable and 65% performed to the contracted price; 63% of traditional projects were on schedule and 54% on budget; 94% of P3 projects were delivered for less than 5% over the contracted price; and the majority of overages were caused by changes initiated by the client.

Publication: Flyvbjerg, Bent, Mette K. Skamris Holm, and Søren L. Buhl. "How Common and How Large Are Cost Overruns in Transport Infrastructure Projects?". *Transport Reviews*, Vol. 23, No. 1, 2003, pp. 71–88. https://pdfs.semanticscholar.org/2e52/a61f619c2b8919c193a95477fd9485b0a356.pdf.
Findings: This paper reviewed 258 traditionally delivered and financed transport projects across 20 countries and found significant cost overruns. The average cost escalation for rail was 45%, for tunnels and bridges 34%, and for roads 20%. The authors found that cost estimates were highly misleading and had not improved over the preceding 70 years.

Publication: Mott MacDonald. *Review of Large Public Procurement in the UK.* July 2002. https://www.parliament.vic.gov.au/images/stories/committees/paec/2010-11_Budget_Estimates/Extra_bits/Mott_McDonald_Flyvberg_Blake_Dawson_Waldron_studies.pdf.
Findings: The Mott MacDonald consultancy reviewed 50 large UK projects delivered through traditional and P3 delivery. The traditionally delivered projects experienced average delays of 17% and budget overages of 47%. The P3 projects experienced average delays of -1% and budget overages of 1%.

Publication: Government Accountability Office. *Transportation Infrastructure: Managing the Costs of Large-Dollar Highway Projects.* GAO/RCED-97-47. February 1997. https://www.gao.gov/assets/160/155775.pdf.
Findings: The GAO reviewed 30 traditionally delivered and financed projects over $100 million in the U.S. and found that 23 of the 30 projects had cost increases ranging from 2% to 211% beyond initial estimates. Half of the projects had cost increases greater than 25%.

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67 Keyser Marston Associates, *Otay Mesa Enhanced Infrastructure Financing District Infrastructure Financing Plan*, Otay Mesa Enhanced Infrastructure Financing District Public Financing Authority, June 2017, https://www.sandiego.gov/sites/default/files/otay_mesa_eifd_infrastructure_financing_plan_final_08-04-17.pdf.

68 "California Assembly Bill 1866," https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=201720180AB1866.

69 "Executive Order B-30-15," April 29, 2015, https://abag.ca.gov/abag/events/agendas/J051515a-Item%2006,%20Executive%20Order.pdf.

70 Currently, interest income from private activity bonds is exempt from income taxes but is still subject to the Alternative Minimum Tax, which makes the interest taxable for investors subject to the AMT. As a result, PABs have a lower interest rate than taxable debt but a higher rate than standard tax-exempt debt, due to the AMT penalty.

71 Volume cap is an annual limitation on the amount of PABs that can be issued. This means that not all projects in need of financing can access it.

72 *Legislative Outline for Rebuilding Infrastructure in America*, The White House, February 2018, https://www.whitehouse.gov/wp-content/uploads/2018/02/INFRASTRUCTURE-211.pdf.

73 The Public Buildings Renewal Act of 2017 (H.R. 960/S. 326), 115th Congress (2017–2018), authorizes Private Activity Bonds for qualified public buildings, including schools, college and university facilities, libraries, courthouses, health care and laboratory facilities, and other public facilities, including government offices: https://www.congress.gov/bill/115th-congress/senate-bill/326.

74 "IRS Revenue Procedure 2017-13," https://www.irs.gov/pub/irs-drop/rp-17-13.pdf.

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