# Project Labor Agreements and Bidding Outcomes

The Case of Community College Construction in California

By Emma Waitzman and Peter Philips

## Executive Summary

This is a study of the effects of using Project Labor Agreements (PLAs) in the construction of community college projects in California. We divide the study into two parts.

The first part is a case study of seven projects built by the College of Marin, three with PLAs and four without PLAs. The upshot of this case is that the PLAs in comparison to the nonPLAs attracted a similar number of bidders, came in at a slightly lower price point compared to the engineer's estimate, had about the same or fewer construction problems and trained more young, local workers due to the social justice component of the PLAs. We also find that local contractors were eager to bid on both PLA and nonPLA projects while bidders coming from afar preferred to bid on either the PLA or nonPLA projects but not both.

The second part is a statistical study of 88 community college PLAs and 175 community college nonPLAs representing $501 million in PLA work and $206 million in nonPLA work. controlling for when and where these projects were built, and how large each project was, we found that the PLA projects had slightly more bidders compared to nonPLA projects. We also found that PLA low-bids came in slightly lower compared to nonPLA projects. From these results, our conclusion is that PLAs do not reduce the number of bidders nor do they raise costs on California community college projects.

### Case Study

In June 2004, bond measure C passed in Marin County, California, providing $249.5 million to modernize the facilities of the local community college, the College of Marin. The modernization of the College included the construction of 7 new buildings, 3 of the projects were completed under a Project Labor Agreement (PLA) and 4 were not. All construction occurred between 2008 to 2015 providing a useful opportunity to compare bidding and construction on similar PLA and non-PLA projects

The PLA included common stipulations including sections outlining grievance procedure, management rights, and work rules. Like many PLAs, the College of Marin PLA included a social justice component encouraging the hiring of local workers, veterans, and disadvantaged workers, such as those with a criminal record. The PLA also stipulated that contractors were to hire students enrolled at the College to work on the project.

All seven new buildings were finished on time. A study of the first two PLA projects by Dannis, Woliver, and Kelley, Attorneys at Law concluded that "the two PSA [Project Stabilization Agreement—a synonym for a PLA] projects had fewer problems than some non-PSA projects." The College's satisfaction with the two PLA projects approved in 2008 led the College to assign a third project to be administered under the PLA in 2013.

Initially, each project was completed under budget. However, alterations following completion of two of the four nonPLA projects imposed cost overruns leading to final amounts that exceeded their original budgets. Nonetheless, it appears the cost overruns were related to architectural design errors rather than faulty construction.

Five College of Marin students were hired on PLA projects. Each student was trained by a different trade—sheet metal, carpenters, electricians, laborers, and plumbers. A recent study of apprenticeship training concluded that apprentices that complete their programs earn about $300,000 more over their work-lives compared to workers without apprenticeship training. One student, Julian Stone stated: "My whole life I've wanted to be a carpenter….The PLA project gave me the opportunity I needed to get my life together and going in the right direction"

In all cases, the lowest bid (excluding subsequent cost-overruns in two cases mentioned above) came in under the engineer's estimate. For the four nonPLA projects, the sum of the lowest bids was $38 million or about $10 million per project. The sum of the engineer's estimates for these four nonPLA projects was $50 million or about $12.25 million per project. The average number of bidders was 9.5 per project, and the average nonPLA project came in at 79% of the engineer's estimate.

In the case of the 3 PLA projects, the sum of the lowest bids was $66 million or about $22 million per project. The sum of the engineer's estimates for these three PLA projects was $88 million or about $29 million per project. The average number of bidders was 7.3 per project and the average PLA project came in at 75% of the engineer's estimate.

On average, those contractors who bid only on nonPLA projects were located 51 miles from the College of Marin's Kentfield Campus. Those who bid only on the College's PLA projects were located 63 miles from Kentfield. However, those contractors who bid on both PLA and nonPLA projects at the College of Marin were located much closer to the Kentfield Campus—on average they were found about 25 miles from the College of Marin.

This "U" shaped relationship seems to reflect that those contractors interested only in bidding on nonPLAs or only on PLAs were willing to look far afield for such opportunities. Those interested specifically in College of Marin projects, regardless of whether they were PLAs or not, were located closer to the Kentfield Campus in the first place.

## Statistical Study

We supplement our case study of the College of Marin with a statistical analysis of 88 PLA and 175 nonPLA community college projects representing $501 million in PLA work and $206 million in nonPLA work. Built in 10 California community college districts over the period 2007 to 2016, using statistical analysis controlling for when and where these projects were built, and how large each project was, we found that the PLA projects had slightly more bidders compared to nonPLA projects, but that this difference was not statistically significant. Our findings rejected the hypothesis that PLAs reduced the number of bidders compared to nonPLA projects.

In a second statistical analysis of low bids on 105 projects where the engineer's estimate was available, controlling for when and where the project was built, and how large the project was envisioned to be based on the engineer's estimate, we found that PLA low-bids came in slightly lower compared to nonPLA projects, but that this difference was not statistically significant. Our analysis rejected the hypothesis that PLAs raised the cost of projects relative to the engineer's estimate compared to nonPLA projects.

**Errata**

An earlier version of this report mistakenly identified the winner of the Main Building Complex PLA project for the College of Marin as Gonsalves and Stronck when it fact, Di Giorgio Contracting won this bid. This mistake has been corrected.

## About the Authors

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## Acknowledgements and Disclaimers

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## Introduction

Project labor agreements (PLAs) are pre-hire contracts between project-owner representatives and local construction unions. PLAs account for an ever increasing amount of both public and private construction projects. PLAs become a public policy issue when there are differing views on how best tomanage public works construction. Proponents of PLAs argue that these contracts facilitate both efficient construction and the attainment of related public policy objectives such as local hire or the training of local youth and/or other targeted groups in construction skills. Critics of PLAs contend that these contracts increase the cost of public construction primarily through a hypothesized reduction in the number of bidders on public works. The assertion is that PLAs discourage some contractors from bidding on these projects. This, in turn, reduces competition which in turn raises construction costs. In this study, we will directly address this hypothesis both in a case study and in a statistical analysis of bidding on 263 community college projects.

A 2001 study of California PLAs by the California Research Bureau, California State Library found that

> …private construction projects in California are much more likely to use PLAs than are public projects. Of the 82 project labor agreements reviewed for the content analysis in this report, nearly three-quarters (72 percent) were private sector agreements. In addition, 22 out of 23 private cogeneration electricity plants recently built or under construction in California used PLAs.[i]

Since this study, the use of PLAs has been growing in California. There are no comprehensive data on the growth of private PLAs, but in the California public sector data show clear growth in the use of PLAs. In the 1990s, on average, 3 new public sector PLAs were signed per year; in the 2000s, on average, 11 new government PLAs were signed per year; and between 2010 and 2016, on average 16 new public sector PLAs in California were signed per year. Of the 234 public PLAs signed since 1993, 26 (11%) have been community college PLAs.[ii] Counting up signed project labor agreements gives only a rough measure of the growth and distribution of public sector PLAs in California because a project labor agreement can entail one building project or many separate building projects; and the size of these projects can vary.

PLAs serve many purposes in both the private and public sectors, but a common purpose is to ensure the supply of a trained and qualified labor force. Other purposes sometimes include a process to customize work schedules or work rules to the project's needs, and the channeling of local workers (or workers from a targeted group such as veterans or at-risk youth) into registered apprenticeship or pre-apprenticeship programs and a career in the construction trades.

Despite these potential benefits, PLAs are controversial because critics assert that PLAs raise construction costs. In states such as California where public construction is governed by prevailing wage regulations, PLA critics assert that on public works, PLAs raise costs primarily by restricting the number of contractors willing to bid on PLA projects.

This study is the first to test this hypothesis. We do this in two ways. First we provide a detailed case study of 7 projects, 3 PLA and 4 nonPLA jobs, built by the College of Marin between 2007 and 2015. Then, we test the reduced-number-of-bids hypothesis using data for 88 PLA and 175 nonPLA community college projects in California representing $501 million in PLA work and $206 million in nonPLA work. In both cases, we ask the question, did the use of PLAs raise public construction costs by restricting the number of contractors bidding on these PLA projects compared to their nonPLA counterparts?

We begin this report by describing the distinctive turbulence that characterizes the construction industry and makes the creation and retention of a qualified and safe construction labor force particularly challenging. Understanding the broader challenges of construction and the training of skilled labor contextualizes the issues surrounding project labor agreements. The basic point here is that construction turbulence makes it difficult to train and to retain skilled workers in this industry. PLAs are one mechanism for addressing the challenge of obtaining a skilled and qualified labor force to build a public or private project.

## Construction Context[1]

Construction is an extraordinarily turbulent industry which makes it difficult to train and retain a skilled and experienced blue collar workforce. Yet, primarily through obligations enforced by collectively bargained contracts, in California, construction is continually being refreshed by the supply of newly trained workers graduating from registered construction apprenticeship programs. Roughly every five years, 15% of the California construction workforce is newly trained journeyworkers graduating from registered apprenticeship programs. This reflects an annual investment of around $250 million with 97% of the graduating apprentices coming from jointly sponsored contractor/union programs.[iii]

Construction is a dangerous and deadly industry. In California, construction has the third highest injury and fatality rates of any major industry behind only agriculture and transportation.[iv] Training and experience help construction workers be safer. For example, residential construction which has few apprenticeship-trained journeyworkers has twice the industry average injury rate. Nonresidential construction and heavy-and-highway work which have many more apprenticeship-trained journey workers have half the construction-industry average injury rate.[v] Registered apprenticeship training helps create the skills and knowledge that keep construction workers safe.

Registered apprenticeship training also pours the foundation for a lifetime of better earnings. Mathematica estimates that registered-apprentice graduates earn over their

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[1] This section may be skipped by readers who are familiar with the unique challenges of the construction industry and how apprenticeship programs address the problems of skill development and worksite safety. The next major section addresses the hypothesis that public PLAs restrict the number of bidders.

work lives $300,000 more than their comparable counterparts who do not attend registered apprenticeship programs.[vi]

But a trained and experienced workforce is also important to owners. While systematic data are not available measuring the effects of the lack of training and experience on delayed work-schedules and workmanship defects, few practitioners in the construction industry would maintain that skill and experience are not important ingredients in construction success.

## Construction Volatility Hampers Training and Experience

Constituting, on average, about 4.5% of the California labor force, construction is the most turbulent of the major California industries. At the peak of the last business cycle, in 2006, 933,000 workers were employed in California construction. This was 5.6% of all California workers. (Figure 1) At the trough of the business cycle, in 2010, 560,000 were employed in California construction amounting to 3.5% of the overall workforce. By 2015, construction employment was back up to 725,000 and 4.1% of the total California labor force. From peak in August 2006 to trough in March 2011, California construction lost 45% of all its jobs and by July 2015, California construction jobs were still 20% below the 2006 peak. This means almost 1 out of every 2 workers in construction in 2006 was gone in 2011 while by 2016 half of those who left had to return after an absence of up to 5 years or be replaced by new workers. Construction is like a giant sponge, constantly sucking in and squeezing out workers. This underscores the challenge of retaining trained and experienced workers in construction.

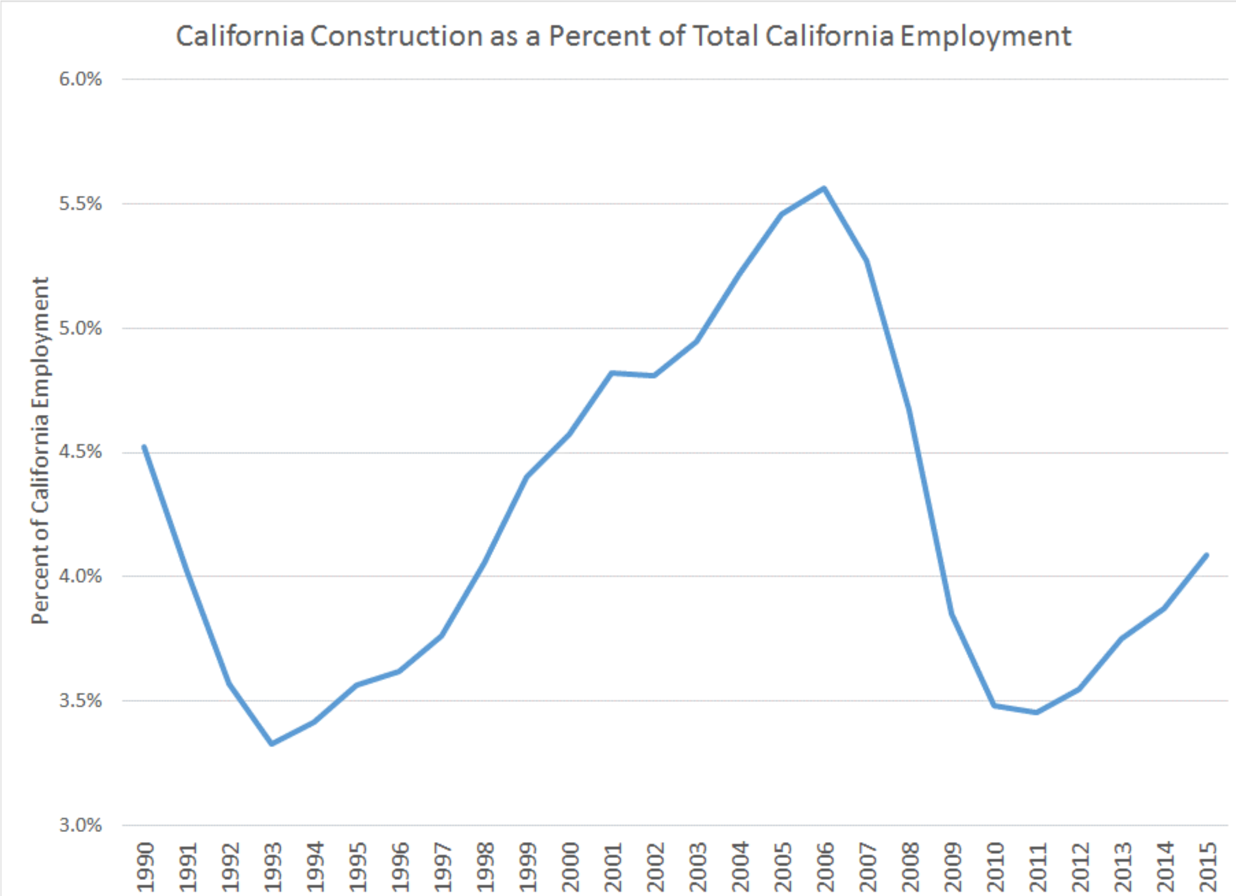


*Figure 1: California annual construction employment as a percent of total California employment, 1990 to 2015*[vii]

Not all sectors of the California construction industry have recovered from the Great Recession at the same pace. Figure 2 shows that employment in the construction of utility systems has now exceeded its 2006 peak, and employment in the construction of nonresidential buildings is coming close to its 2006 peak. In contrast, employment in residential building construction still lags at 65% of its 2006 peak, and overall construction employment in 2015 was only 78% of construction employment at the peak in 2006. When some sectors recover faster than others, the recovering sectors bear the heaviest burden finding ways either to induce experienced workers to return to the construction industry or to train a new generation of construction workers.

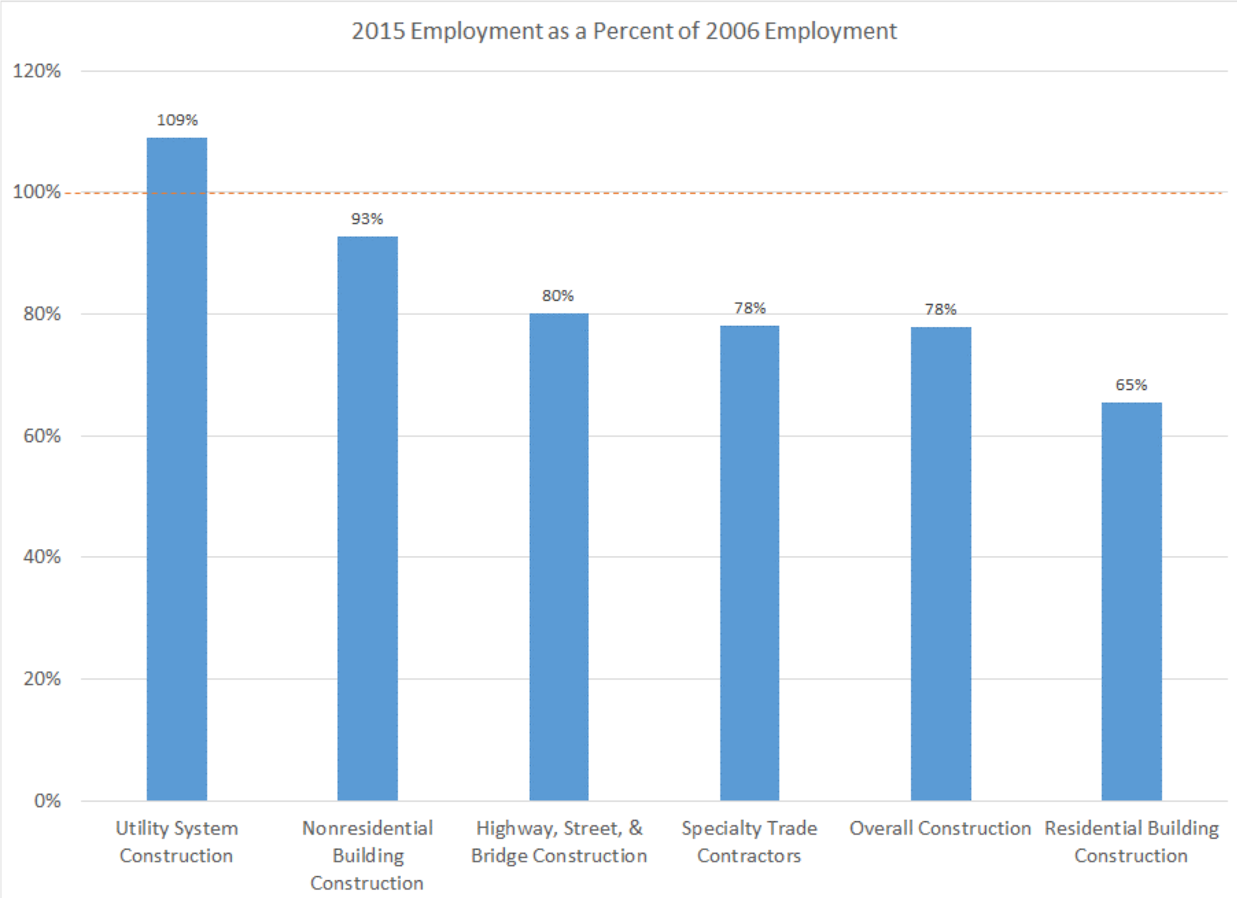


*Figure 2: 2015 California construction employment by sectors as a percent of peak California construction employment in 2006*[viii]

However, the challenge of training and retaining skilled and qualified workers combines the acute trauma of business cycles like the Great Recession with the chronic strain of seasonal employment volatility. Figure 3 compares California's construction employment turbulence to the relatively mild seasonality of the overall California labor market looking at 2000 to 2016 using monthly employment data. Overall employment is shown on the left vertical axis and construction employment is shown on the right vertical axis. The axes are calibrated to allow for a comparison of the relative volatility in both cyclical and seasonal employment. The amplitude of the business cycle in construction combines with the persistent volatility of seasonal work to create much less certain employment prospects for construction workers compared to workers in the overall California employment. Again, construction is like a giant sponge cyclically and seasonally sucking in and squeezing out workers with no guarantee that the worker that was squeezed out last time will be the worker who gets sucked in this time. As a consequence, skills and experience get lost at each turn of the cycle.

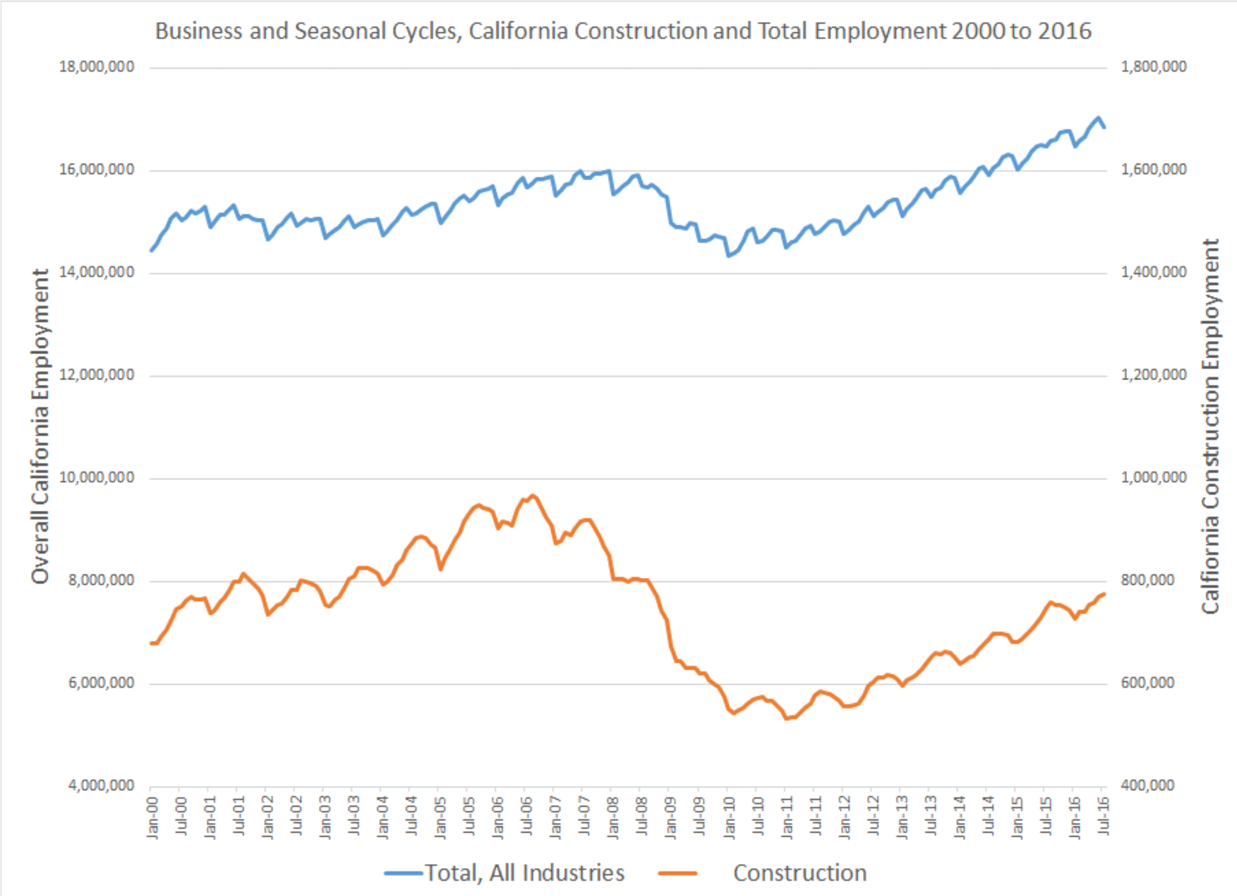


*Figure 3: Comparing California's construction business and seasonal employment cycles to overall California employment, 2000 to 2016*[ix]

## Training a Safe and Qualified Labor Force in the Face of Turbulence

The problem of retaining construction workers in an industry that can toss out 10% of its workforce across the seasons and 45% of its workforce across the business cycle, makes it difficult to finance the training of construction workers. Why train a worker if the job is going to disappear and the worker with it? Yet because construction depends upon craft skills to insure the quality of construction along with trained and experienced workers to fend off the inherent dangers of construction work, training does in fact take place.

In the unionized sector of construction, collective bargaining creates a framework for financing the accumulation of human capital in construction. Contractors signing collectively bargained agreements are bound by those agreements to contribute a set amount of money for each hour of work they win in order to finance the training of the next generation of construction workers. Because of this contractual agreement, California union contractors invest substantial sums of money each year to build and run extensive registered apprenticeship training systems. In 2012, California union contractors invested $230 million in apprenticeship training and graduated 15,200 apprentices.

Nonunion contractors, facing the same skilled labor challenges, also invested in registered apprenticeship training. In 2012, nonunion contractors spent $28 million on registered apprenticeship training and graduated 420 construction apprentices.[x]

Over the five-year period, 2011 through 2015, California's joint contractor/union apprenticeship programs graduated 72,400 construction apprentices. Their nonunion counterparts graduated an additional 2050. Together this added more than 74,000 newly skilled construction workers to the California construction labor force. Over this 5-year period, an average of 640,000 employees worked in California construction three-fourths of whom were blue collar workers.

So, in California, over a five-year period, newly graduated apprentices represented 15% of the construction labor force while joint labor-management (union) programs accounted for 97% of the new Journeyworkers and the unilateral (nonunion) programs contributed an additional 3% of the newly skilled labor force. This constant refreshing of the California labor force with newly trained workers is the essential ingredient in maintaining effective and qualified construction manpower in the face of chronic yet unpredictable construction turbulence.

## The Importance of Training to Workers

### Safety

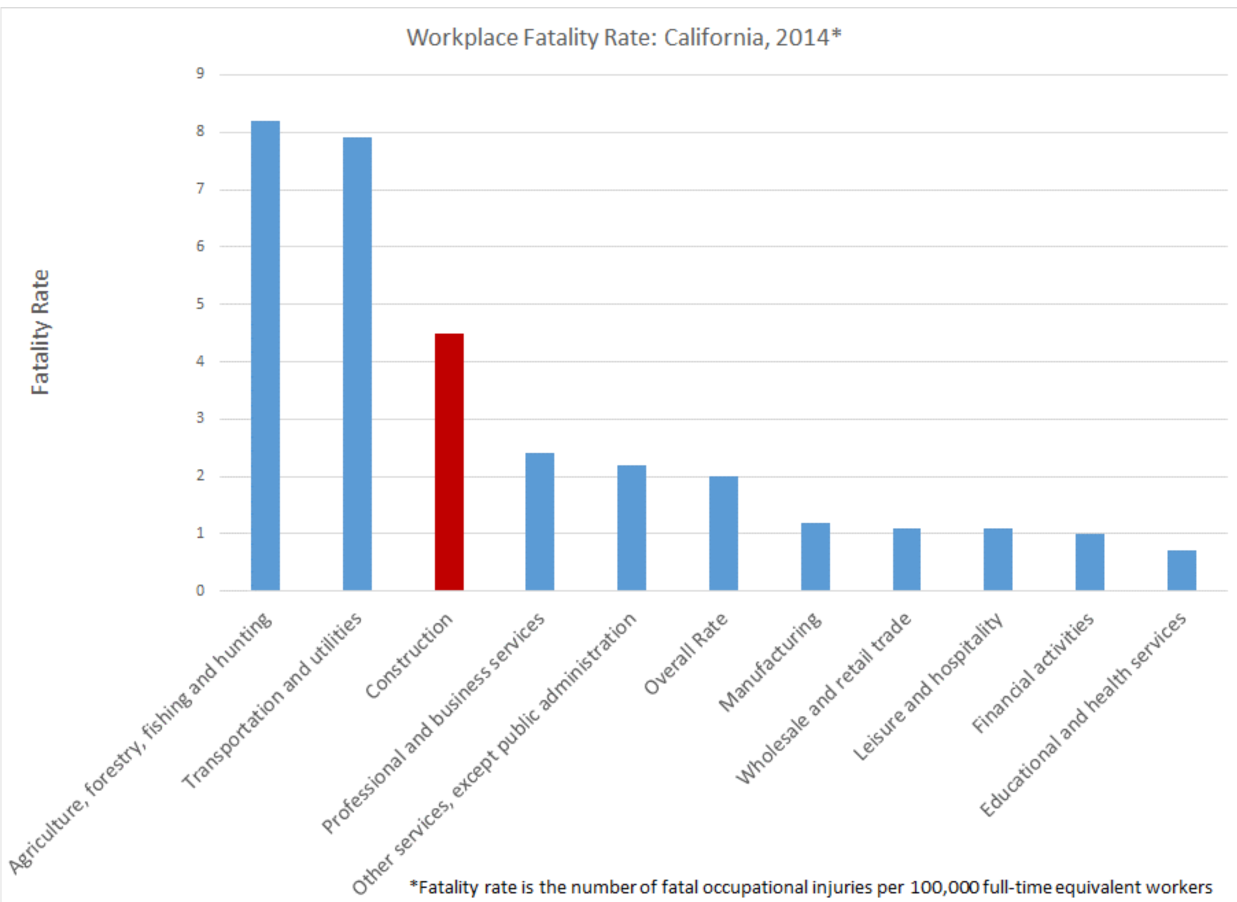


*Figure 4: California workplace fatality rate by industry, 2014*[xi]

Construction is among the deadliest of major industries. Figure 4 shows that the occupational fatal injury rate in construction is more than twice the national average and third behind only agriculture/forestry/fishing and transportation in the risk of death.

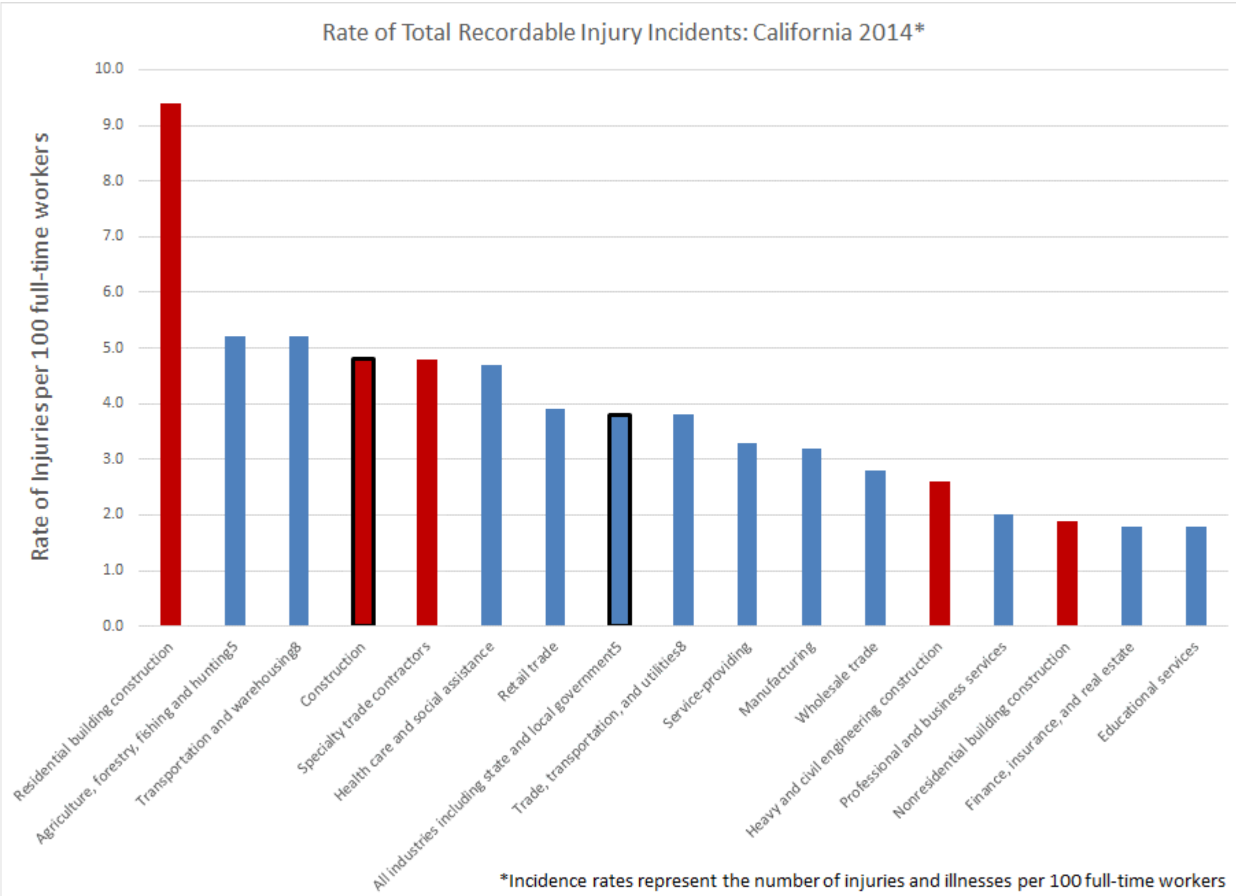


*Figure 5: California workplace total recordable injury rate for selected industries and construction sub-industries*[xii]

Figure 5 shows that in terms of injuries, again construction, as a whole, is almost as dangerous as agriculture and transportation and has about a 20% higher overall injury rate compared to the economy as a whole. But there is a wide difference in the risks of injury across construction segments. Residential construction has almost twice the injury rate compared to construction as a whole while nonresidential building construction has less than half the injury rate compared to construction as a whole. This reflects the fact that very few graduates of registered apprenticeship programs go into residential construction. Even heavy and highway construction, which involves roughly the same exposure to roads and heavy equipment as found in transportation, nonetheless has an injury rate that is roughly half the injury rate of overall construction and overall transportation. Heavy civil construction has a high percentage of apprentice-trained Journeyworkers because this is a predominately unionized sector of California construction and much of this work falls under prevailing wage regulations which either require or encourage apprenticeship training.

Construction work is inherently dangerous. Construction volatility, by constantly churning experienced workers out of the industry and pulling inexperienced workers into construction, exacerbates the inherent dangers of this work. Training, in general, and apprenticeship training, in particular, is key to mitigating these dangers. That is one reason why training is important to construction workers.

## Income

As will be discussed below, apprenticeship training substantially raises the current and lifetime incomes of construction workers. An example of the effects of registered apprenticeship training on earnings can be seen comparing the earnings profiles of solar installers to electricians. Figure 6 shows the earnings career paths of solar installers in California's Bay Area compared to electrician pre-apprentices moving into apprentice status and then graduating to becoming journeyworker electricians.

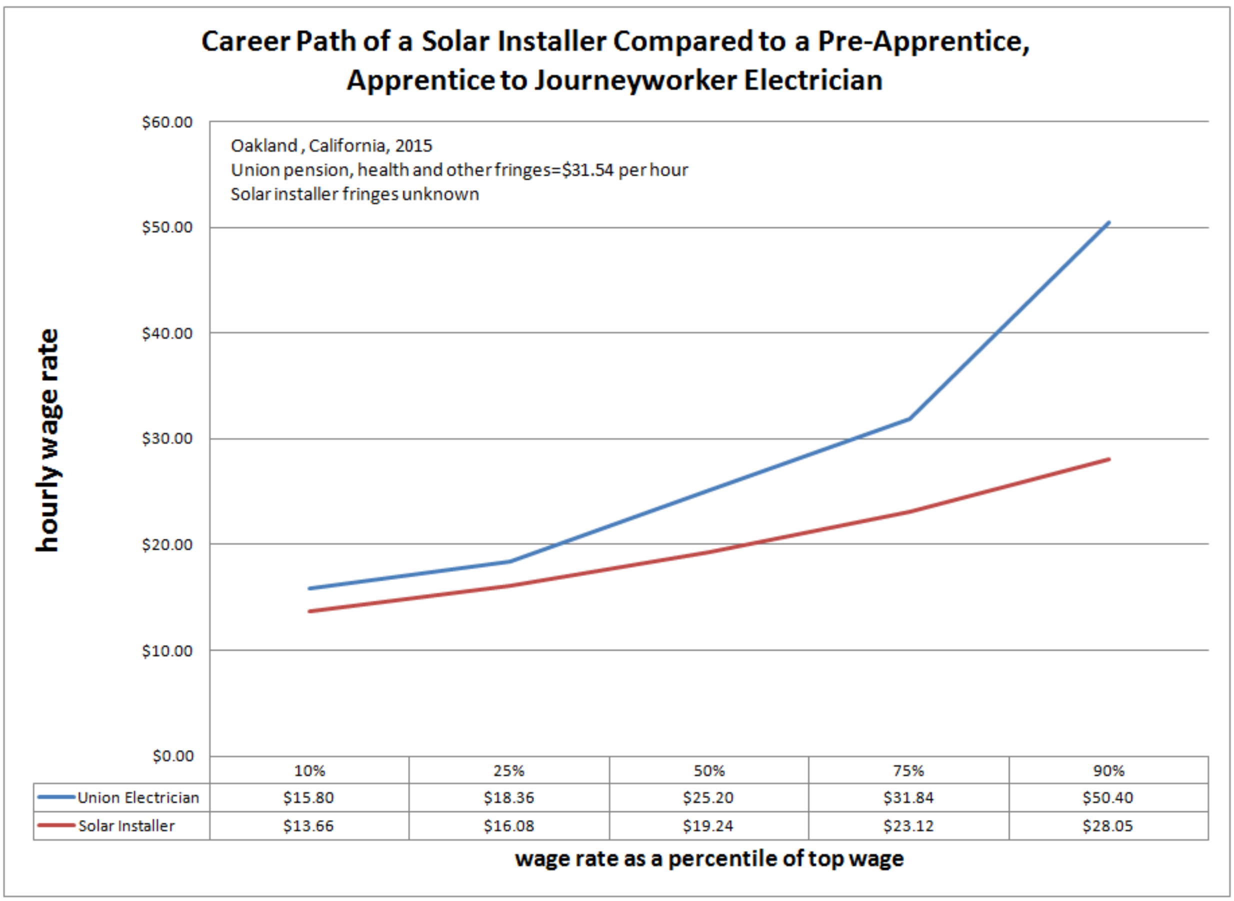


*Figure 6: Comparing the career paths of rooftop solar installer to union electrician pre-apprentice, apprentice, Journeyworker*

In the case of solar[xiii] installers, we do not have a regulated career path. Rather, on a more informal basis, solar installer earnings rise with more experience either through raises from their employer or by moving to higher paying employers. The paths of solar installers

and pre-apprentice electricians[2] begin close to each other in terms of entry level wages. As pre-apprentices gain experience, their wages rise, but only slightly faster than solar installers. Once the pre-apprentice enters the apprenticeship program, his/her earnings grow much more quickly and significantly compared to solar installers. This difference widens substantially once the apprentice graduates to journeyworker status.[3]
This more advantageous earnings profile of the electrician career path compared to the solar installer path is due to the fact that apprenticeship training for electricians does not focus exclusively on the skills needed for photovoltaic construction jobs. The pre-apprentice/apprentice path steadily broadens the apprentice's training to encompass the entire electrician craft. The young worker eventually gains knowledge of a wide range of skills, qualifying him/her for a wide range of projects—and this broad occupational skill set is essential not only for higher hourly wage rates but also for staying employed in a turbulent construction market. The solar installer learns only the specific tasks associated with solar installation jobs, which limits the worker's job opportunities and potential earnings.

When benefits are also considered, the difference in the electrician and solar installer occupations are even more dramatic. Figure 6 does not show the differences in benefits between the electrician path and the solar installer path because government data on solar installation earnings do not include benefits. Nonetheless, in general, one would expect that the benefit advantages of apprenticeship training are probably even greater than the wage advantage.

## The Importance of Training to Owners

Design flaws, unexpected weather, unforeseen worksite conditions, change orders, faulty workmanship, inferior materials, delays in supplies, labor shortages, worksite disorganization and a host of other problems can plague construction activity and lead to costly delays in finishing the project. Insurance for the project, the contractor and subcontractors can help mitigate the costs of construction delays and construction defects; but like anything else, an ounce of prevention is usually worth a pound of cure.
Blue collar workforce training is one key element in providing that ounce of prevention. A skilled and knowledgeable crew of craft workers is the final link in the chain from initial design to the final completion of a project. Workers who know what they are doing can judge the quality of most of the materials going into the project providing a final assessment against material defects. Experienced craftsmen who know how to work

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[2] Also known within the electrician's union as "construction electricians".
[3] The comparison of these wage profiles is only approximate because in the case of pre-apprentices and apprentices, their wages rise in lockstep with their experience on-the-job and classroom training. In the case of solar installers, the data reflect the distribution of solar-installer wages, but there is no guarantee that any one solar installer will necessarily rise up that profile from bottom to top with increased experience and training. With some companies that will be the case, and others not. Some installers will have to rely upon market mobility and opportunity to harvest a payoff from increased experience and training.

together provide the final piece needed to translate a potentially chaotic system of layered subcontracting into an organized and smoothly running system of construction. Skilled workers who know their craft provide an immediate judge of the quality of their own work. Skilled construction workers provide the checks and balances that make the anthill of a major construction site a coordinated effort. Without a doubt engineering, planning and supervision are also keys to a successful construction project; but in the craft work that entails most construction, making sure that those who are actually doing the construction are skilled and experienced is necessary to insure a timely completion of a quality project.

### The Role of PLAs in Obtaining a Trained and Qualified Labor Force

Project labor agreements insure that most of the blue collar workers on the project come from the local union halls of the crafts on the project. As will be shown below, in California, the overwhelming majority of construction Journeyworkers who have received formal, registered apprenticeship training come from the union sector of construction. Also typically union hiring halls confer priority in call-outs to local union members. Thus, PLA requirements tend to insure that most workers on a project are sourced locally and are either the products of registered apprenticeship training or are currently enrolled in a registered apprenticeship program or are in line to enter a registered apprenticeship program through a pre-apprenticeship program.

Nonunion contractors can and do bid on PLA projects. On public works in California, PLA provisions sometimes allow for nonunion contractors to bring a fixed number of key workers onto the project without going through the union hall. This allows the nonunion contractor to use that contractor's best workers in concert with union workers coming from the hall.

So a primary selling point that advocates of PLAs present is that PLAs provide a trained and qualified labor force without excluding key nonunion workers who may have firm-specific skills that the nonunion contractor wants to have to tackle the project effectively.

## The Hypothesis that Public PLAs Restrict the Number of Bidders

On public projects not governed by prevailing wages, PLA critics may argue that PLAs raise costs by raising wages relative to what might be obtained without PLAs. This issue is in dispute because PLA advocates argue that by insuring a more productive workforce, PLAs in these situations offset potentially higher wages with higher productivity. Regardless of the outcome of these disputes, in the context of public works governed by prevailing wage regulations such as those in California, the wage-differential argument is largely irrelevant.

The essence of the argument has been summarized in a study that was critical of the use of PLAs:

> Opponents argue that PLAs increase costs. They claim that the requirements imposed by PLAs discourage nonunion contractors from bidding on projects and subcontractors from participating. This reduced competition, it is claimed, results in overall higher bids.[xiv]

This study did not seek to measure the effect of PLAs on the number of bids. Rather, it attempted to measure the cost differences between PLA and nonPLA projects and then attributed these differences to an assumed difference in bid competition plus possible differences in work rules across PLA and nonPLA projects.

Here we address the hypothesis that PLAs restrict competition head on by directly testing whether PLAs encourage, discourage or have a neutral effect on the number of bidders on PLA projects compared to nonPLA projects. In testing this hypothesis, we control for other factors that influence the number of bidders on a project such as the size of the project and when during the construction business cycle, the project was let.

## Project Labor Agreements

### What Is a Project Labor Agreement?

Project labor agreements are pre-hire labor agreements between construction unions, as a group, and representatives of an owner intending to build a project or set of related projects. If we think of a "project" as a construction activity for which there is a bid opening, one project labor agreement can cover either one project or multiple projects. In the multiple project case, these separate projects would be gathered under a unifying umbrella such as a bond issue financing a set of projects. While the requirements of PLAs can vary dramatically depending on the needs of the parties entering into the agreement, almost universally, PLAs promise two things: first, most (but in the public sector, not all) of the blue collar workers on the project will be dispatched through local union hiring halls. Second, during the life of the agreement there will be no work stoppage regardless of whether there are either strikes or lockouts elsewhere within the local construction labor market.

In addition to these universal aspects of PLAs, project labor agreements become customized to the desires and intentions of the signatory parties—the owner and the local unions (bargaining as a group). Customized aspects of PLAs may include unique provisions regarding scheduling and overtime, specific regulations regarding work rules and craft jurisdictions, quota provisions regarding local hire or local participation in apprenticeship programs, distinctive safety programs or project-specific worker compensation procedures.

From the unions' perspective, PLAs are concessionary contracts where specific owners controlling important work obtain a set of concessions or sweeteners in exchange for most or all blue collar workers coming from the hiring hall. In the public sector, PLAs almost always contain a provision allowing contractors to obtain some key blue collar workers outside the hiring hall system. The amount and flexibility of the key worker provision is subject to bargaining as are all the other provisions of a PLA.

Many PLA projects are large. After all, the incentive that induces separate craft unions to bargain as a group and provide concessions to an owner relative to local collective bargaining agreements is that the owner has a good deal of work on offer. However, when a PLA covers multiple projects under the umbrella of a construction bond or other unifying element, specific projects within the larger set need not be themselves large projects. So while many specific PLA worksites are large—such as airport construction or a sports stadium or a large civil engineering project—many other specific PLA worksites are smaller but encased within a larger construction agenda which allowed the owner to lure the unions to the bargaining table.

PLAs are used in both the private and the public sector. This study focuses on public community college construction in California some of which was governed by PLAs and some not. Public sector PLAs are controversial because they involve public procurement policy. Some nonunion contractor associations oppose the use of PLAs in public construction procurement.

In our case study and statistical sample, all the community college construction was governed by California's prevailing wage law. Prevailing wage laws set the wage rates and benefit packages by craft that are to be paid on public works. While these regulations are not always obeyed, nonetheless, in general, in California, wages on public works tend to reflect wage rates established in local collective bargaining agreements.

## Critics of Project Labor Agreements

Critics of public project labor agreements in prevailing wage law states argue that PLAs increase construction costs on public works by restricting the number of contractors willing to bid on these projects compared to comparable public projects without PLAs.[xv] They argue that some nonunion contractors are unwilling to bid on PLA projects because these contractors do not wish to obtain the majority of their blue collar labor from the local union hall. They also may be deterred from bidding if the PLA requires that they pay into the collectively bargained health and retirement funds for their key workers, especially if they are already paying privately for these workers' health insurance or 401ks.

Proponents of PLAs argue that many nonunion contractors do bid on PLAs and that the alleged deterrence effect of PLAs are exaggerated. They further suggest that PLAs may attract (primarily union) contractors that otherwise would not bid on those projects.

PLA critics call attention to a 2004 renovation project at the, Burckhalter Elementary School in East Oakland, California. The case was summarized in an article in SF Gate:

> A call for bids went out, and a San Rafael firm that specializes in school construction -- M.A. Davies Builders -- came in with the low estimate of $1.8 million, beating out seven competitors….Before a final deal was signed, the school district announced that -- after years of on-again, off again talks -- it had signed a breakthrough labor pact with Alameda County's trade unions. The pact is supposed to ensure labor peace in future school construction projects. It sets local hiring goals, encourages job apprenticeships and requires that a percentage of workers be hired out of the local union halls….But as a result of the labor pact, the school district decided to rebid the Burckhalter contract…. This time, there were only three companies in the running, and the lowest bid, from Albay Construction of Contra Costa County, was just over $2.2 million….[A] a project manager for Albay, whose own bid went up nearly $167,000 the second time around, discounted the idea of additional paperwork [causing the bid increase] -- saying it's pretty routine for any public works project. Instead, the manager cited the reduced number of bids the second time (because many contractors had already lined up summer work) and the increased costs of materials.[xvi]

From the perspective of PLA critics, the Burckhalter Elementary School case provides an example of how PLAs increase costs (from $1.8 to $2.2 million) due to a reduction in bidders (from 7 to 3). The fact that the PLA promised labor peace, set local hiring goals, and encouraged apprenticeship training were potential (and not necessarily inevitable) future benefits that had to be weighed against the immediate 22% increase in costs.

### Questions to Be Asked

In this study, we do two things. First, we examine in detail the case of seven construction projects built by the College of Marin over the period 2008 to 2015, three under project labor agreements and four absent PLA requirements. This detailed case allows for a nuanced assessment of the two questions—do PLAs restrict competition and do PLAs deliver on promised construction and community benefits?

Second, we statistically examine 263 community college construction projects in California built between 2007 and 2016. One-third (88) of these projects was built under PLAs while two-thirds (175) were not. In terms of construction costs, of the total $707 million of work in our sample, a little more than two-thirds ($501 million) were built with PLAs while a little less than one-third was not. With this large sample, we are able to control for confounding factors such as in what month a project was bid in order to test the hypothesis that PLAs restrict the number of bidders on public works. This is an important question because the assertion that PLAs restrict the number of bidders on projects is the central, untested proposition leading to the contention that PLAs in prevailing wage law states raise public sector construction costs.

## College of Marin Case Study

In this section, the modernization projects at a community college in Marin County, California, the College of Marin, serve as a case study to analyze the effect of project labor agreements on contractor bid participation, and the relation of bidding to prior engineer's estimates of costs.

Marin County is part of the Northern Bay Area in California, near San Francisco. The PLA adopted by the College of Marin was the first PLA to be used on a public works project in Marin County and the ninth to be used by a college district in the Bay Area.

The modernization of the College of Marin provides a useful case study because the college used both PLA and nonPLA arrangements for its projects. Modernization at the college included the construction of 7 new buildings. Three of the projects were completed under a PLA and 4 were not. Variables such as location, source of funding, and project ownership, were held constant while project cost, size, and contractors varied across the 7 projects. All construction occurred within a time-span of seven years, from 2008 to 2015. These circumstances allow for a useful opportunity to compare PLA and non-PLA projects. In the second section of this study, we will extend our analysis to 263 California community college projects, 88 of which were built under PLAs.

### The Decision to Modernize Marin

The College of Marin is a two-year community college in Marin County. It was established in 1926, under the name Marin Junior College. The original school consisted of a single campus in central Marin, now called the Kentfield Campus. In 1975, a separate college was built in Northern Marin, the Indian Valley College. When the Indian Valley College was under threat of closure in 1985, it merged with the College of Marin as a second campus for the college, the Indian Valley Campus. The College of Marin offers two-year training in vocational and career programs, programs leading to an associate's degree, and community education courses. The College primarily serves students from the surrounding area; there are approximately 250,000 residents in Marin County.[xvii] From 2010 to 2015 an average of 6,985 students were enrolled in classes for credit each year. About 77% were enrolled part-time, with the remaining 23% enrolled full-time.[xviii]

In 2002, outside consultants surveyed the physical structures on the College of Marin campus. They reported the facilities were worse than over 90% of community college districts across California, 108 schools at the time. The report, using a Facility Condition Index (FCI) metric, concluded, "The overall FCI of the facilities [...] is considerably worse than what we find for facilities of similar age and function across the nation."[xix]

Two years earlier, shoddy infrastructure of school districts across California was receiving attention in the state legislature with Proposition 39, also known as the "school facilities local vote act of 2000." A core aim of the proposition was to address the poor condition of school buildings. The initiative instituted more oversight of tax dollar use and made it easier for schools to acquire funds for repairs and modernization. Proposition 39 reduced the voter approval required to pass bond measures from two-thirds approval to 55% if the institution agreed to convene an oversight committee. "This initiative helps fix classroom overcrowding and provides much needed repairs of unsafe and outdated schools," said Gail D. Dryden, President of the League of Women Voters of California.[xx] For facilities at the College of Marin to be determined among the worst of campuses across California during a time when the deterioration of facilities statewide was sparking legislative action is an indication of the extent to which the physical structures at Marin had depreciated.

This finding may be surprising given the affluence of the surrounding county of Marin. The median income in Marin in 2014 was $95,749, 55% higher than the statewide median.[xxi] Officials suggested one explanation for the disrepair was under-enrollment at the college.[xxii] Below-capacity enrollment at the College of Marin contributed to underutilization and neglected maintenance of already aging college facilities. The lack of upkeep was especially damaging at the Indian Valley Campus due to the environmental exposure of the rural location of the campus.[xxiii]

The decision by the College of Marin to merge with the Indian Valley College in 1985 was partly justified by widely publicized projections of population increase in the county. However, the population increase did not occur as predicted and the number of students the College of Marin was tasked to serve did not grow at the expected rate. The college was built to serve a full-time enrollment of 5000 students. It hit an all-time high in 1992 of 2,653 students.[xxiv] Following 1992, the college experienced a downward trend in enrollment. By 2004, full-time enrollment at the College of Marin had shrunk by 39%, totaling just 1,613 students for the Fall semester. Part-time enrollees similarly decreased.[xxv]

Due to below-capacity enrollment, campus buildings were underutilized and infrequently maintained. By 2000, most buildings were over 60 years old and had received little to no updating. The latest major renovation to have occurred at either the Kentfield Campus or the Indian Valley Campus was in 1976.[xxvi] The lag in new construction, coupled with the neglect of facilities, gave rise to the shabby state of campus buildings highlighted in the 2002 assessment.

In 2004, a reporter from the *Marin Independent Journal* interviewed Don Flowers and Bob Thompson, two maintenance officials at the College of Marin. The article described the conditions of the Fine Arts Center:

> Thompson and Flowers pointed out a slew of problems with the Center, ranging from rusted air conditioning pipes on the roof patched with duct tape to buckled roofs that had caused water to leak through the classroom ceilings, [...] officials said parts of the building contain asbestos or lead paint [and] parts of the building were inaccessible to disabled students, including the women's restroom, the elevator and the theater. The building had no air-conditioning in key areas - including the computer lab and in art rooms containing welding machinery and pottery kilns.

Similar shortcomings were noted at the Science Center.

Many officials supported the belief that renovation was key for preserving the College of Marin and changing the direction of enrollment numbers.[xxvii] Yet the decision to modernize the campus was not inevitable. A series of community meetings was initiated in 2002 to discuss various courses of action. Among the proposed scenarios were: doing nothing, selling one or both campuses, and redeveloping the campuses. A report by the Marin County Grand Jury described the attendance of community members at the meetings as "significant," noting participants' dedication to maintaining the school and their support for updating college buildings.[xxviii] In June 2004, bond measure C was placed on the ballot for $249.5 million to modernize College of Marin facilities. The commitment by locals to revitalize the College of Marin was expressed formally by a 63% vote of approval. The timing of the vote was important. Just four years earlier, before the passage of Proposition 39, the vote would have been a defeat.

## Slow Start to Construction

Though the bond measure was approved in 2004, the construction of major projects at the College of Marin did not begin until 2008. A few issues contributed to the delay. The College of Marin president resigned in 2003 after an 80% vote of no confidence by faculty.[xxix] In 2004, the Board was still finalizing the hiring of a new administrative team. Furthermore, in 2005 the College received an accreditation warning from the Western Association of School and Colleges (WASC). The WASC evaluates schools in the Western region to ensure the quality of the school's programs and recommend areas of improvement. Five areas for improvement were identified at the College of Marin. Issues ranged from revising the school's mission statement, to educational planning, to determining the college's health care liability. Resources designated to the modernization process were refocused to addressing the WASC review.

The educational planning component mentioned in the WASC warning was directly related to the modernization planning process. The state required a detailed "educational master plan" in order for the college to move forward with modernization. The plan, an overview of current and desired educational programs at the college, was intended to inform facilities planning. At the time of the bond approval, the College of Marin had not completed an educational master plan and the facilities master plan "lacked sufficient detail….to determine project design and cost."[xxx]

The final master plan was not submitted until early 2006. The drafting process was lengthy in part due to the school's prioritization of community inclusion and input. Holding public forums and community meetings was time consuming. Determining a list of prioritized projects and incorporating alterations into the designs, such as the inclusion of a "green" aspect, worked to further extend the process. Thus, initial projections for breaking ground in 2006 were overly optimistic.

The lag in construction was damaging on multiple levels. For one, the reputation of the college was already on shaky ground following media coverage of the enrollment drop, the accreditation warning, and the resignation of the college president. The construction delays were covered in local news. The changing public view regarding the delays can be seen in the titles of two editorials published in the *Marin Independent Journal*. "Prudent approach by [College of Marin] trustees" was published in 2005.[xxxi] In 2007 the *Journal* published, "[College of Marin] deserves public scrutiny."[xxxii] But, by 2008 construction was underway and the tone of news coverage turned favorable. An editorial entitled, "Groundbreaking a sign of progress at College of Marin" read, "the 'rebuilding' of the county's community college is hitting full stride."

While the reputation of the College of Marin could be restored, there was no repair for the cost impacts of the construction delays. Between the bond passage in 2004 and the start of construction in 2008, there was a sharp increase in the price of construction materials. The price of products across all manufacturing industries rose 21% from January 2004 to January 2008.[xxxiv] In particular, College of Marin officials noted the rise in the price of steel as particularly problematic.[xxxv] From January 2004 to January 2008, the price of steel rose 56%.[xxxvi] Initial plans to modernize the College of Marin budgeted for nine new buildings. As a result of higher material costs, two buildings were dropped and a third was downsized. The price increases also had environmental implications. The level of intended LEED (Leadership in Energy and Environmental Design) certification was lowered for some buildings, and the extent of desired solar panel installation was cost prohibitive. The board discussed strategies for organization and efficiency going forward, including use of a project labor agreement

## Adopting a PLA at Marin

In part due to the slow start of construction, the College of Marin opted to consider using a Project Labor Agreement as a potential organizational tool to expedite construction. Discussions of a PLA had occurred prior to the delay. In 2005, the College's consulting firm, Swinerton Management & Consulting, presented information to the board on PLAs and on using a contractor prequalification process. [xxxvii]In order to use a PLA, the College of Marin was required to gain approval from the Board of Trustees. A vote by the Board was scheduled for June 2007.

In May, one month before the College of Marin Board was to vote, another PLA vote occurred in Marin County. The Central Marin Sanitation Agency Commissioners met to vote on the use of a PLA for a 30-month sewage project in Marin County. At the time of that meeting, no PLAs had been used on public works projects in Marin County. Only private projects in Marin had used PLAs, the first being The Buck Institute for Research on Aging, which began construction in 1996[xxxviii]. The Sanitation Agency Commissioners voted unanimously against the use of a PLA on the sewage project. A trustee from the College of Marin, Greg Brockbank, attended that meeting. He told a reporter the College of Marin Board had not yet taken a position on a PLA. [xxxix]

Despite the vote by the Sanitation Agency, PLAs were becoming increasingly prevalent on public works projects in California school districts. By the time of the College of Marin vote in 2007, 30 PLAs had been entered into by California school districts, 11 of which were by community college districts. All 30 PLAs had been adopted after 1998. PLA use was particularly concentrated in the "Bay 10," the ten school districts in the San Francisco Bay Area. There were 21 community colleges within the Bay 10 in 2007, including the College of Marin. Eight of the 11 community college PLAs had been passed in the Bay 10 districts.[xl] The eighth was passed by Foothill De-Anza College, just two months before the June 2007 vote at the College of Marin.

The increasing use of PLAs by Bay 10 colleges may have been a contributing factor to the decision at Marin. Swinerton Management & Consulting presented the data on the Bay 10 schools to the board. Furthermore, the week before the College of Marin meeting, the decision at Foothill De-Anza College was mentioned in local news. An article in the *Marin Independent Journal* noted, "the unanimous vote by the [Foothill De-Anza] district's board in April came on the heals [sic] of testimony from workers that nonunion contractors underpaid them or didn't pay benefits."[xli] The article also quoted interviews with College of Marin officials regarding their motives for considering a PLA.

Administrators highlighted a stipulation of the proposed PLA requiring contractors to hire College of Marin students, thereby offering hands-on training for students on construction-related vocational tracks. College of Marin president Frances White told reporters, "the value of having a program where students could train in the construction industry is my biggest interest in the whole thing ... that is important because, in Marin, the No. 1 fastest-growing industry is construction." Board of Trustees President, Wanden Treanor, reiterated the value of the educational component, focusing on the "green" aspects of the training. She said, "my understanding is that the unions put together a curriculum dealing with solar and thermal issues. I think there is some great potential."[xlii]

The selection of the use of PLAs on some of the College's projects was also based on the desire for efficiency and the belief that a PLA would guarantee availability of large workforce necessary to complete the larger projects on time. The College of Marin proposed the use of a PLA on the two largest modernization projects, the Science/Math/Central Plant Building on the Kentfield Campus and the Main Building Complex on the Indian Valley Campus. A third project would eventually be added to the PLA in 2013, the New Academic Center on the Kentfield Campus.

The original division of projects was such that the bond money funding PLA and non-PLA construction would be about equal. It was also suggested that the apportionment was beneficial to local firms, as " 'the very cost of the [larger] projects might be prohibitive to smaller companies' " due to bonding requirements, and therefore would "likely be awarded to larger companies elsewhere in the Bay Area."[xliii]

On June 12, 2007, the College of Marin Board of Trustees met to vote on the use of a PLA. Seven publicly elected members convened in front of a 125-person audience.[xliv] Representatives from both sides of the debate over the use of PLAs testified in front of the Board. Four individuals argued against the use of a PLA and ten individuals spoke in favor of the Agreement.

Only two oral testimonies were submitted in writing for inclusion in the Board of Trustees meeting minutes. Those speaking in opposition of the PLA did not provide written testimony. However, quotes recorded by local news sources give a sense of the discourse.

Frank Tallarida, a resident of Novato, spoke in opposition of the PLA. He had attended the meeting for the sewage project in Marin a month early. His comments to the Sanitation Agency Commissioners were quoted by the *Marin Independent Journal*, "you have an obligation to spend tax dollars prudently….a PLA is going to increase the cost[xlv]"

Another opponent of the PLA was quoted following the College of Marin meeting. Eric Christen, co-director of the Coalition for Fair Employment in Construction, called the PLA and non-PLA division of college projects "inherently discriminatory." He said, "Fifty percent discrimination is 100 percent wrong."[xlvi]

A representative of the building and construction trades council, Secretary-treasurer Jack Buckhorn, spoke in favor of the PLA. He also provided his testimony in writing. In his testimony, Buckhorn summarized his view of the benefits and uses of PLAs. He concluded:

> Please remember, a PSA [Project Stabilization Agreement—another name for a PLA] is a construction risk management tool being used to protect the district and the taxpayers' investment. … They also encourage higher quality contractors & subcontractors to bid the district's projects, use local skilled workers,… prevents work stoppages, keeps the money in the local economy, and increase worksite safety[xlvii]

The Board also heard testimony from officials at other California community college districts that used PLAs. Richard Holober, vice president of the San Mateo County Community College District's Board of Trustees, told the Board at Marin, "we believe a project labor agreement is integral to a successful work project [...]we have no work stoppages."[xlviii]

Anita Grier, president of the board of trustees at City College of San Francisco also testified. She said, "We believe the project labor agreement was very successful. There are no strikes. There is no work stoppage allowed." A trustee on the Board for the West Contra Costa School District, Charles Ramsey, also spoke positively about the experience with the PLA at his school.[xlix]

Finally, the report by Swinerton Management and Consulting summarized the use of PLAs by the San Mateo school district and the Peralta school district. They wrote, "all projects had multiple bidders and the bids were at or below the estimates. The contractors performing the work on the projects were a mix of union and non-union contractors. The construction projects were completed on schedule."[l]

A member of the College of Marin Board of Trustees also spoke and submitted written testimony. In his testimony, Greg Brockbank described the course of the PLA debate in Marin and decried the tactics used by the Association of Builders and Contractors:

> This has been an unprecedented issue at College of Marin that has generated…dozens of e-mails, a dozen snail-mailed packets…articles and studies, two mailers to tens of thousands of Marin households, and our two major political parties pitted against each other. In summary, I'm dismayed that clearly inaccurate and misleading charges of anti-competitiveness, increased costs, and bait-and-switch by the ABC [Associated Builders and Contractors] has resulted in so much unjustified furor and worry in the public….One can only wonder at the blatantly anti-union political agenda of ABC….Do they fear having their contractors and workers working alongside well-trained union workers and fear operating under a system which will make it harder for anyone -union or non-union - to cut corners?[li]

Trustee Brockbank ended with an opinion regarding PLA use, "PLAs work,… make it more likely that a project will come in on time, within budget, with high quality work, under safe working conditions, without undue disruption, delays, or labor strife."[lii] The board voted 6 to 1 to approve the PLA. Trustee Barbara Dolan was the single "nay" vote, explaining she saw the PLA as discrimination against non-union firms.[liii] One year later, on June 10, 2008, the College of Marin PLA was officially enacted.

On April 16, 2013 the College of Marin Board of Trustees considered the addition of a third project to the PLA, the New Academic Center on the Kentfield campus. The law firm Dannis Woliver Kelley gave a presentation to the board. Presenters stated, "Assurance of quality workers under PSA could come into play as the construction market (and skilled labor supply) tightens over the years."[liv] Board meeting minutes read, "Trustees expressed support and appreciation of the presentation noting that our PSA projects have been successful and positive experiences and have provided local hiring and student training."[lv] The Board approved the expansion of the PLA to cover the Academic Center.

## The Marin PLA

The College of Marin PLA was signed by 22 local trade unions representing over 65,000 Northern California members.[4][lvi] When it was signed in 2008, the College of Marin was the ninth community college to sign a PLA in the Bay 10 Districts. The Agreement included common stipulations of a PLA including sections outlining grievance procedure, management rights, and work rules. The College of Marin Agreement borrowed language from the Solano Community College Agreement and the Chabot-Las Positas Agreement signed in 2004 and 2007, respectively. Under the section "Purposes" all three agreements read, "the purposes of this Agreement are to promote efficient construction operations on the Project, to insure an adequate supply of skilled craftspeople and to provide for peaceful, efficient and binding procedure for settling labor disputes."[lvii][lviii][lix]

Like many PLAs, the College of Marin PLA included a "social justice" component. PLAs often promote the hiring of local workers, veterans, and disadvantaged workers, such as those with a criminal record. The College of Marin PLA encouraged all three. PLAs on community college projects often include an additional social justice component, which reflects the unique population they serve, students. The stipulation requires contractors to hire students enrolled at the college to work on the project. The section on student hire in the College of Marin PLA reads:

> Each contractor or subcontractor performing work covered by this Agreement shall employ on its regular workforce at least one (1) eligible College of Marin student or graduate who is enrolled and participating in an approved construction training course, program, pre-apprenticeship and/or Joint Apprenticeship program....In recognition of the College of Marin's desire to have District-trained students employed on its Project(s), a subcommittee of the Labor Management Committee...shall be established...to establish appropriate criteria and procedures...[lx]

Student-hire had been incorporated into community college PLAs in California since 2001 when the Los Angeles Community Colleges district enacted the first community college PLA in the state.[lxi] When the College of Marin PLA was signed, 7 out of the 11 community college PLAs in the state included student hire programs.

## Bidding, Construction, Results

Between 2008 and 2015 seven new buildings were constructed at the College of Marin. The Performing Arts Building, the Fine Arts Building, Diamond Physical Education Center, and the

[4] The figure 65,000 union members comes from a compilation of data on the website Unionfacts.com. For some union locals, we could not find a membership number.

Transportation Technology Complex were built first. These were the smallest of the seven projects, and these did not use a PLA. Construction followed on the Main Building Complex, the Science/Math/Central Plant Project, and the Academic Center, all of which were built under the PLA. All projects achieved LEED Gold Certification except for the Physical Education Center, which achieved LEED Silver Certification.[lxii]

All seven new buildings were finished on time. Common delays, unrelated to labor, occurred on all projects during construction. Environmental testing was time-consuming. Indian artifacts were found on some sites requiring site survey. In winter months, weather issues in other states delayed arrival of materials. On one project, a labor dispute occurred. The project, the Science/Math/Central Plant Project, was being built under a PLA. The grievance procedure laid out in the PLA was triggered, and the dispute was promptly resolved. The dispute was not an indication of broader unrest on the project. A study of the first two PLA projects by Dannis Woliver Kelley Attorneys at Law concluded, “the two PSA projects had fewer problems than some non-PSA projects.”[lxiii]

Initially, each project was also completed under budget. However, alterations following completion of two projects imposed cost overruns leading to final amounts that exceeded their original budgets. These two projects were the Performing Arts building and the Fine Arts building. These were nonPLA projects built by non-union contractors. However, it appears the cost overruns were unrelated to construction. Rather, architectural design errors caused costly building alterations. These two facilities had a number of issues. For one, an outdoor walkway pooled excessive rainwater during wet months. In addition, these two buildings had issues with ventilation, fire code compliance, and mold. The College of Marin filed two lawsuits against the firm Marcy Wong Donn Logan Architects for design flaws, which the College alleged cost close to $2million in repairs.[lxiv]

In addition to time and budget matters, the PLA projects delivered on their aim to offer College of Marin students construction training opportunities. Five College of Marin students were hired on PLA projects to participate in construction. Each student was hired and trained by a different trade. Sheet metal workers, carpenters, electrical workers, laborers, and plumbers each hired a College of Marin student to participate in modernizing the College. One student, Julian Stone, wrote a letter to the Board of Trustees encouraging continued PLA use. In his letter he wrote:

> “The PLA that was a part of the new math and science building at the College of Marin changed my life in the best way possible…. My whole life I’ve wanted to be a carpenter, and after trying countless times to get my foot in the door I was quite discouraged. The PLA project gave me the opportunity I needed to get my life together and going in the right direction”[lxv]

The value of registered apprenticeship training to young people such as Julian Stone is substantial. A 2012 Mathematica study for the US Labor Department concluded:

> RA [registered apprenticeship] is designed to improve the productivity of apprentices through on-the-job training and related technical instruction. We assessed RA effectiveness by comparing the earnings of RA participants to those of nonparticipants, adjusting for differences in pre-enrollment earnings and demographic characteristics. We found that RA participation was associated with substantially higher annual earnings in every state studied….For RA participants who completed their program, the estimated career earnings are an average of $240,037 more than similar nonparticipants.[lxvi]

In addition to hiring student workers, the PLA projects also complied with the stipulation encouraging the hire of local workers. The Marin County Building Trades unions that signed the PLA gave preference to members who lived in Marin for dispatch on the College of Marin projects.

## Bidding on College of Marin Projects

### The Pattern of Bidding.

Twenty-nine contractors bid on College of Marin projects. We have been able to determine the company location of 27 of those contractors. Table 1 shows summary information on how contractors bid on College of Marin projects.

*Table 1: Summary bid information by contractor for College of Marin projects*

| Contractor | Project | | | Percent Won | | Contractor Location |
|---|---|---|---|---|---|---|
| | nonPLA | PLA | Total | nonPLA | PLA | |
| Alten Construction | 4 | 2 | 6 | 75% | 0% | Richmond |
| Arntz Builders | 3 | 1 | 4 | 0% | 0% | Novato |
| Di Giorgio Contracting | 3 | 1 | 4 | 0% | 100% | Novato |
| Jeff Luchetti Construction | 3 | 1 | 4 | 0% | 0% | Santa Rosa |
| Midstate Construction | 3 | 1 | 4 | 33% | 0% | Petaluma |
| Lathrop Construction | 1 | 2 | 3 | 0% | 50% | Benicia |
| Roebbelen Construction | . | 3 | 3 | . | 0% | El Dorado Hills |
| SJ Amoroso | . | 3 | 3 | . | 0% | Redwood Shores |
| West Bay Builders | 3 | . | 3 | 0% | . | Novato |
| Wright Contracting | 1 | 2 | 3 | 0% | 50% | Santa Rosa |
| Bobo Construction | 2 | . | 2 | 0% | . | Elk Grove |
| C Overaa Construction | 1 | 1 | 2 | 0% | 0% | Richmond |
| Gonsalves & Stronck | 1 | 1 | 2 | 0% | 0% | San Carlos |
| JW & Sons | 1 | 1 | 2 | 0% | 0% | Petaluma |
| Biltwell Dev | 1 | . | 1 | 0% | . | San Francisco |
| Codding Construction | 1 | . | 1 | 0% | . | Santa Rosa |
| Howard S Wright Constructors | . | 1 | 1 | . | 0% | Emeryville |
| McCarthy Building Companies | . | 1 | 1 | . | 0% | San Francisco |
| McCrary Construction | 1 | . | 1 | 0% | . | Belmont |
| Menghetti Construction | 1 | . | 1 | 0% | . | Modesto |
| NBC General Contractors Corp. | 1 | . | 1 | 0% | . | Oakland |
| PAGE Construction | 1 | . | 1 | 0% | . | Novato |
| ProWest Construction | . | 1 | 1 | . | 0% | |
| R Debbelen | 1 | . | 1 | 0% | . | |
| Ralph Larsen & Sons | 1 | . | 1 | 0% | . | San Mateo |
| West Coast Contractors | 1 | . | 1 | 0% | . | Fairfield |
| Younger General Contractors | 1 | . | 1 | 0% | . | Rancho Cordova |

| | | | | | | |
|---|---|---|---|---|---|---|
| ZCON Builders | 1 | . | 1 | 0% | . | Roseville |
| Zolman Construction | 1 | . | 1 | 0% | . | San Carlos |
| **Total** | **38** | **22** | **60** | **11%** | **14%** | |

Fifteen contractors bid only once on the College of Marin projects in our study. Of all the nonPLA projects, 32% of the bids came from one-time-bidders while 14% of the PLA project bids came from one-time-bidders. None of the one-time bidders won a project.

Four contractors bid on two College of Marin projects. Three of these two-time-bidders bid both on a PLA and a nonPLA project; one two-time-contractor just bid on nonPLA projects. All the two-time-bidders failed to win any of the projects.

Five contractors bid three times on College of Marin projects. Two of these three-time-bidders bid on both PLA and nonPLA projects while two just bid on PLA projects and one just bid on nonPLA projects. Wright Contracting and Lathrop Construction were the two that bid on both PLA and nonPLA projects in this group, and both won one of the PLA projects. The other three contractors all lost on all three of their bids.

Four contractors bid four times on College of Marin projects. They all bid on both types of projects. Midstate Construction won one of the nonPLA projects while Di Giorgio won one of the PLA projects.

Alten Construction bid on 6 of the 7 College of Marin projects and won three of the four nonPLA projects. Alten bid on two of the three PLA projects, coming in sixth (out of 8) on the Indian Valley Complex and third (out of 6) on the Gateway Center.

Contractors had an 11% chance of winning a nonPLA project (4/38) and a 14% chance of winning a PLA project (3/22). The winning contractors on the nonPLA projects came from Richmond and Petaluma while the winning PLA contractors came from Benecia, Santa Rosa and San Carlos.

With this pattern in mind, we ask two questions: where did the bidding contractors come from and what was the relationship between the winning bids and the engineer's estimates on the projects they won?

## Where Bidders Came From

Table 2 shows that four contractors bidding on 10 nonPLA projects and 2 PLA projects came from Novato winning one PLA bid. Three contractors came from Santa Rosa, providing 5 nonPLA and 3 PLA bids and winning one PLA project. Two contractors came from Petaluma providing 4 nonPLA and 2 PLA bids and winning one nonPLA project. Two contractors came from Richmond providing 5 nonPLA and 3 PLA bids and winning 3 of their 5 nonPLA bids. Two contractors came from San Carlos providing 2 nonPLA and 1 PLA bid but winning no bids. Two contractors came from San Francisco providing I nonPLA and 1 PLA bid, but these two contractors lost their bids. Twelve additional contractors from 12 different cities also provided bids—10 nonPLA bids and 9 PLA bids. Only 1 of these 19 bids won—Lathrop Construction from Benecia won one of the PLA projects.

*Table 2: Towns from which bidding contractors came, bids by town and percent won by town and PLA/nonPLA*

| Location | Contractors | Bids | | | Percent Bids Won | | |
|---|---|---|---|---|---|---|---|
| | | nonPLA | PLA | Total | nonPLA | PLA | Total |
| Novato | 4 | 10 | 2 | 12 | 0% | 50% | 8% |
| Santa Rosa | 3 | 5 | 3 | 8 | 0% | 33% | 13% |
| Petaluma | 2 | 4 | 2 | 6 | 25% | 0% | 17% |
| Richmond | 2 | 5 | 3 | 8 | 60% | 0% | 38% |
| San Carlos | 2 | 2 | 1 | 3 | 0% | 0% | 0% |
| San Francisco | 2 | 1 | 1 | 2 | 0% | 0% | 0% |
| Belmont | 1 | 1 | . | 1 | 0% | . | 0% |
| Benicia | 1 | 1 | 2 | 3 | 0% | 50% | 33% |
| El Dorado Hills | 1 | . | 3 | 3 | . | 0% | 0% |
| Elk Grove | 1 | 2 | . | 2 | 0% | . | 0% |
| Emeryville | 1 | . | 1 | 1 | . | 0% | 0% |
| Fairfield | 1 | 1 | . | 1 | 0% | . | 0% |
| Modesto | 1 | 1 | . | 1 | 0% | . | 0% |
| Oakland | 1 | 1 | . | 1 | 0% | . | 0% |
| Rancho Cordova | 1 | 1 | . | 1 | 0% | . | 0% |
| Redwood Shores | 1 | . | 3 | 3 | . | 0% | 0% |
| Roseville | 1 | 1 | . | 1 | 0% | . | 0% |
| San Mateo | 1 | 1 | . | 1 | 0% | . | 0% |
| **Total** | **27** | **37** | **21** | **58** | 11% | 14% | 12% |

Figure 7 shows how far, on average, contractors were located from the College of Marin Kentfield Campus by the percent of the contractor's bids that were allocated to PLA projects. Also each bar in Figure 7 at bottom shows the number of bids for each category. On average, those contractors who bid only on nonPLA projects were 51 miles from the College of Marin Kentfield Campus. But those contractors that bid one-quarter of the time on PLA projects and three-quarters of the time on nonPLA projects were, on average, located 24 miles from the Kentfield Campus. Those contractors who bid one-third of the time on PLA projects were located in Richmond, 13 miles from the PLA campus. These were the closest contractors to the project. Those contractors that bid half the time on PLA projects were, on average, located 26 miles from the Kentfield Campus. Those who bid two-thirds of the time on PLAs were located 35 miles from Kentfield and those who bid only on PLA were 63 miles from Kentfield.

This "U" shaped relationship seems to reflect that those contractors interested only in bidding on nonPLAs or PLAs were willing to look far off for such projects while those interested in College of Marin projects, regardless of whether they were PLAs or not, were located closer to the Kentfield Campus in the first place.

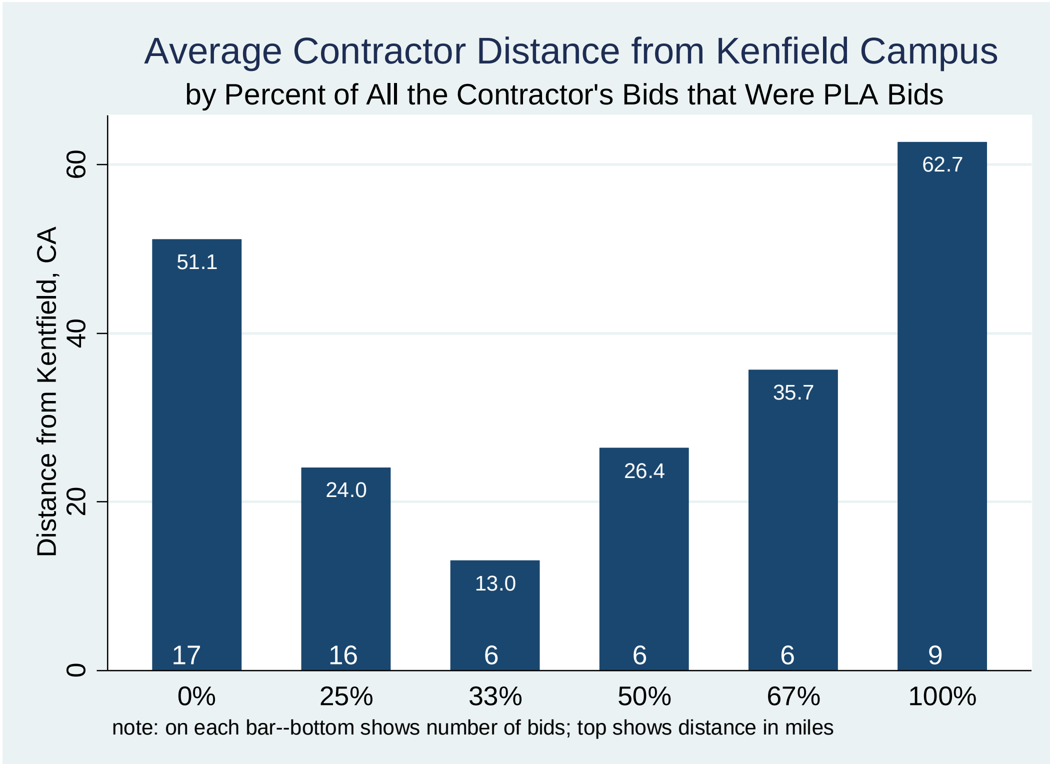


*Figure 7: Contractor distance from Kentfield Campus by percent of all of that contractor's bids that were PLA bids*

This conclusion is supported in Figure 8 which shows that those contractors that bid on four or more of the College of Marin projects, on average, were located, on average, about 21 miles from the Kentfield Campus regardless of whether they bid on PLA or nonPLA projects. Those contractors who bid on 3 or fewer projects were located 46 to 48 mile from the Campus regardless of whether it was a PLA or not. Our conclusion is that nearby contractors interested in College of Marin projects were neither attracted nor repelled by PLA provisions.

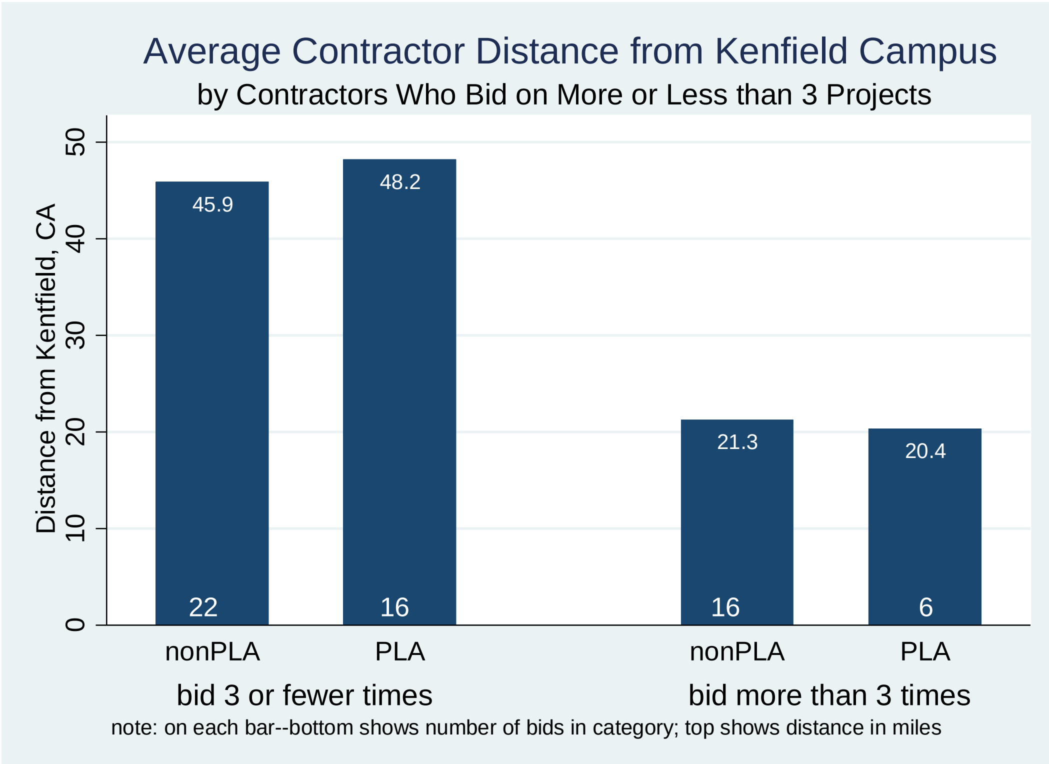


*Figure 8: Contractor distance from Kentfield Campus by whether the contractor bid on 3 or fewer projects or more than three projects by PLA and nonPLA projectsRelationship between Bids and Engineer's Estimate*

Table 3 shows each College of Marin bid result for the four nonPLA and three PLA projects.

*Table 3: Each bid result by nonPLA and PLA projects*

| **nonPLA Projects** | **Diamond PE Complex** | **Fine Arts Center at Kentfield** | **Performing Arts Center** | **Transportation Technology Center** |
|---|---|---|---|---|
| year | 2008 | 2009 | 2011 | 2009 |
| bids | 9 | 12 | 9 | 8 |
| lowest bid | $10,396,307 | $11,872,601 | $10,217,000 | $6,895,000 |
| engineer's estimate | $15,500,000 | $13,400,000 | $11,700,000 | $9,285,000 |
| lowest bid as a percent of Eng. Est. | 67% | 89% | 87% | 74% |
| **PLA Projects** | **Gateway/New Academic Center** | **Indian Valley Campus Main Complex** | **Science Mathematics Central Plant Complex** | |
| year | 2013 | 2008 | 2010 | |
| bids | 7 | 8 | 7 | |
| lowest bid | $18,995,000 | $13,350,000 | $34,040,000 | |
| engineer's estimate | $24,000,000 | $15,700,000 | $48,341,000 | |
| lowest bid as a percent of Eng. Est. | 79% | 85% | 70% | |

In all cases, the lowest bid came in under the engineer's estimate. This may, in part, be due to some of the bidding held in 2008 and particularly in 2009 when the US and California construction industries were in the grip of the Great Recession. We will explore this issue below in the statistical analysis section of this study. Also, engineer's estimates typically are somewhat above the eventual lowest bid, due, in part, to price inflation between the time the engineer's estimate is calculated and the time the project is bid. Also, engineer estimates tend to be more conservative relative to the eventual low-bid with engineers not wanting a project to go ahead based on an unrealistically low estimate. Low-bids, almost by definition, tend to be more aggressive being the lowest among estimates from a set contractors bidding on the project. So while an engineer's estimate certainly can come in lower than all the bids on a project, typically the engineer's estimate is above the low-bid.

Table 4 shows that for the four nonPLA College of Marin projects, the sum of the lowest bids was $38 million or about $10 million per project. The sum of the engineer's estimates for these four projects was $50 million or about $12.25 million per project. The average number of bidders was 9.5 per project, and the average project came in at 79% of the engineer's estimate.

In the case of the 3 PLA projects, the sum of the lowest bids was $66 million or about $22 million per project. The sum of the engineer's estimates for these three projects was $88 million or about $29 million per project. The average number of bidders was 7.3 per project and the average project came in at 75% of the engineer's estimate.

Note that while the PLA projects, on average, received 2 fewer bidder on each project, the lowest bid on the PLA projects was a bit lower relative to the engineer's estimate compared to the nonPLA projects. The PLA projects were, on average, a bit more than twice as large as the nonPLA projects. Larger projects tend to eliminate some contractors who do not have the scale of business to bond and manage larger projects. The larger size of the PLA projects may help account for the fact that on these projects fewer bids did not mean a higher price relative to the engineer's estimate.

Larger projects with fewer bidders can be very competitive bidding environments. When contractors bid on a project, they consider not only the number of competing bidders, but also the opportunity cost to them of losing the bid. They greater value of a larger project justifies contractors investing more in the estimation of their bids which helps them shave their bids towards the true cost of the project. A larger project, being worth more than a smaller project, motivates contractors to reduce their percentage markups for the sake of the absolute value of profit derived from a large project. Larger projects also last longer which allows contractors to reduce their price based on the benefits to them of staying busy for a longer period of time. Finally, the difference between 7 and 9 bidders on a project is not as important as say the difference between 2 and 4 bidders. An old saying in the construction industry is that for the sake of competition, the most important contractor is the second bidder. The additional competitive impact of additional bidding contractors diminishes with each new contractor that enters the bidding. So, it appears that in the case of the College of Marin, the average loss of 2 bidders form 9 on their nonPLA projects to 7 on their PLA projects did not adversely affect the PLA bid competition compared to the nonPLA bidding.

*Table 4: College of Marin summary statistics for 4 nonPLA and 3 PLA*

| | **4 nonPLA** | **3 PLA Projects** |
|---|---|---|

| | Projects | |
|---|---|---|
| sum of lowest bids | $39,380,908 | $66,385,000 |
| sum of engineer's estimate | $49,885,000 | $88,041,000 |
| average number of bidders | 9.5 | 7.3 |
| lowest bid as a percent of Eng. Est. | 79% | 75% |

## The Relationship Between the Engineer's Estimate and The Lowest Bid

Figure 9 shows the engineer's estimate relative to the eventual lowest bid for the 7 College of Marin projects. The straight line in the Figure marks the hypothetical points where the engineer's estimate would be exactly equal to the lowest bid. In every case, the actual lowest bid comes in below the engineer's estimate as measured by the vertical distance between each project marker and the straight line.

For each project, the number of bids on that project is shown next to the project marker. The largest nonPLA project and the smallest PLA project had 9 and 8 bidders respectively. The two larger PLA projects had 7 bidders each and the three smaller nonPLA projects had 8, 9 and 12 bidders.

There is no evidence here of insufficient bidders for these projects. In dollar terms, the lowest bid comes in ever lower than the engineer's estimate as the project size rises while in percentage terms, the smallest nonPLA project and the largest PLA project came in the furthest from the engineer's estimate, 67% and 70% respectively (see Table 3).

Thus, in general, the beneficial effects of the slightly higher number of bidders found on the 4 College of Marin nonPLA projects were offset by the beneficial effects of the PLA projects being larger and more valuable to potential bidders. The result was similar competitive results comparing the 4 nonPLA projects to the 3 PLA projects using the engineer's estimate for each project as a benchmark.

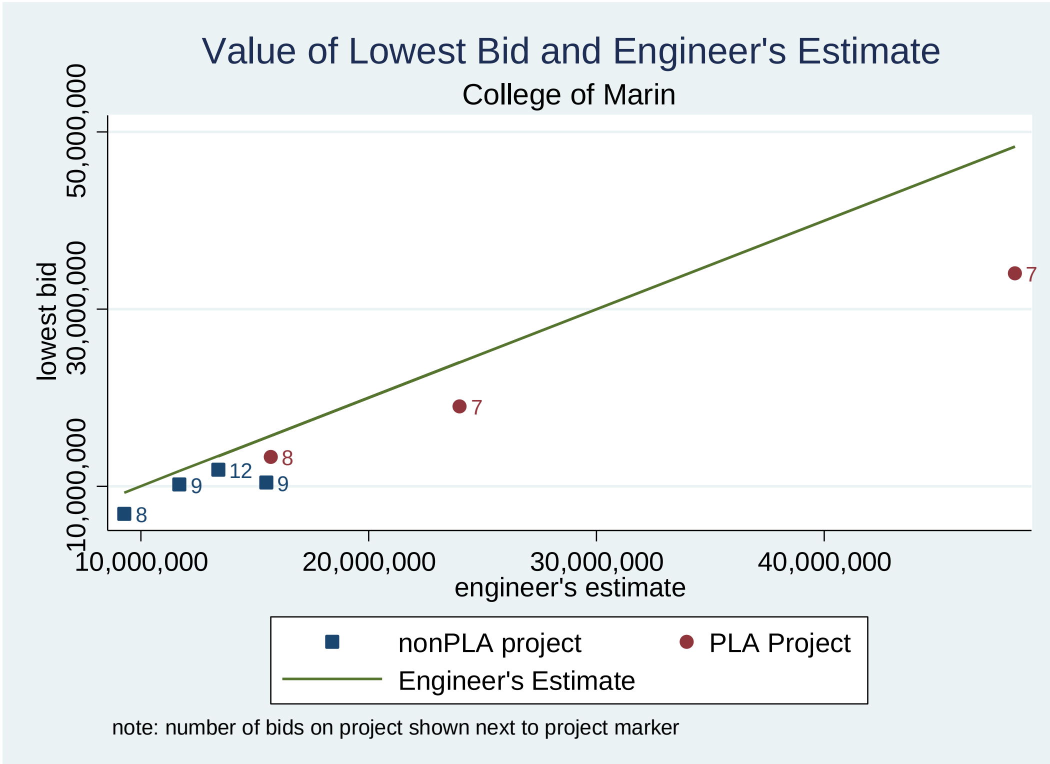


*Figure 9: Engineer's estimate and lowest bid on 4 nonPLA and 3 PLA projects with straight line showing where engineer's estimate would exactly equal the lowest bid (number of bids shown beside the project market)*

## Aftermath and Future Course

Following the use of a PLA at the College of Marin, a second public works PLA was passed in Marin County. In June 2013, the Marin Healthcare District adopted a PLA for the Marin General Hospital Replacement Building Project. Construction on the $394million renovation project began in 2015.[lxvii]

The College of Marin completed the major renovation projects funded by the Bond measure passed in 2004. In 2016, voters approved a second bond measure for $265million to continue modernizing the campus. Bond Measure B received 62.9% approval.[lxviii]

While the college continues to address the issue of outdated facilities, the issue of enrollment still stands. Enrollment at the College of Marin was on the rise between 2007 and 2010, the same years the first modernization projects were completed.[lxix] However, numbers swiftly returned to their downward trend. One factor may have been the expansion of the Santa Rosa Jr. College campus in nearby Petaluma in 2008. As such, many College of Marin facilities, particularly on the Indian Valley Campus, continue to be underutilized. A recent report concluded Marin should downsize the Campus. The report reads, "Although the campus was designed for an enrollment of 5,000, the Spring 2015 enrollment was 1,142.... Failing planned productive use, IVC facilities should be considered for demolition to avoid unproductive use of maintenance funds."[lxx] Nevertheless, the college plans to use a portion of the recently approved measure B funds for continued renovation at the Indian Valley Campus. An Organic Farm and a Pool Building are just a couple projects in the works.[lxxi]

## Statistical Analysis of 263 Community College Construction Projects

We supplement our case study of the College of Marin with a statistical analysis of 263 bid openings for community college projects built in California, primarily Northern California, from 2007 to 2016. We will ask two questions of the data: first, did the one-third of our sample which were bid openings governed by PLAs attract fewer bidders than the two-thirds of the bid openings in our sample that were not covered by PLAs? In asking this question, we will control for how large the project was, and when and where it was put out to bid. Second, in a subset of our sample (105 projects) for which engineer's estimates were available, controlling for when and where the project was built, and how large the project was, did PLAs mean that the low bid came in higher relative to the engineer's estimate compared to nonPLA projects? These two questions speak to the contention that PLAs limit competition and increase costs.

### Description of Data

We obtained public records for 15 of the 26 community college PLAs signed since 2001 covering projects bid between 2007 and the first half of 2016. The 11 missing PLAs either had insufficient or no public bidding data available for analysis. We also collected information from these community colleges for projects built at the same time but not under PLAs.

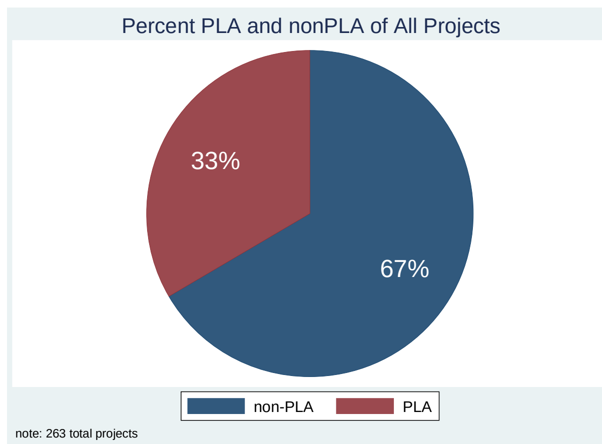


*Figure 10: Distribution of projects by PLA and nonPLA status*

We examined 263 projects. Figure 10 shows that one third or 88 of these projects were governed by project labor agreements while two thirds or 175 of these projects were not PLAs.

Figure 11 (left panel) shows the distribution of the lowest bid on each project by PLA/nonPLA status. In this "box-and-whiskers" graph, the box contains 50% of all the projects. The "whiskers" contain almost all the remaining projects. However, a handful of extremely large projects are omitted from the graph to enhance visual comparisons. These excluded projects are included in our subsequent statistical analysis.

In general, PLA projects were larger than nonPLA projects as measured by the lowest bid. There are several reasons for this. The primary reason is that PLAs are concessionary contracts with no-strike pledges, modified grievance procedures, potential concessions on work rules and potential sweeteners such as student-hire. In order for unions to be willing to 1) bargain as a group and 2) provide concessions, the work on offer to be governed by a

PLA needs to be substantial. Thus, larger projects are more attractive to unions when considering a PLA. From an owner's perspective, larger projects may motivate them to consider a PLA in order to assure themselves of a reliable supply of qualified labor.

However, not all PLA projects are large. If smaller projects are part of a set that add up to an attractive bundle, this may motivate unions to engage in the concessionary bargaining inherent in a PLA. (It should be noted, though that on prevailing wage jobs, wages and benefits including overtime provisions are governed by wage proclamations, and are not subject of concessionary bargaining.)

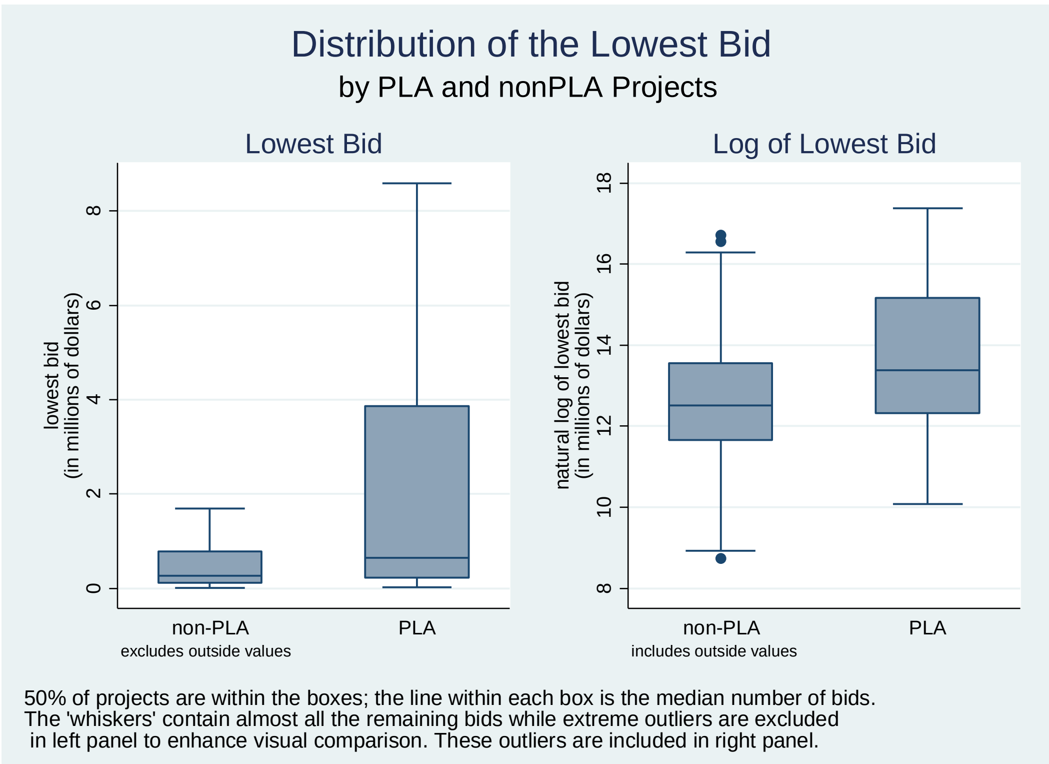


*Figure 11: Distribution of lowest bid on projects by PLA and nonPLA status*

In the right-hand panel of Figure 11, we transform the value of the lowest bid into its natural log. This arithmetical transformation allows for a more balanced picture of the highs and lows of each distribution and permits viewing the extreme values. Because these more "balanced" distributions have some convenient statistical properties, in some analysis, we will use not only the value of the lowest bid to measure the size of projects, but also the log of the value of the lowest bid.

The horizontal line within each box is the median value of the lowest bid (or log of the lowest bid). The median is the midpoint low-bid with 50% of the projects being larger and 50% of the projects being smaller than the median project price. In our sample, the median nonPLA project received a low bid of $273,740 while the median PLA project received a low bid of $669,165. In the right-hand panels, the horizontal lines represent the log of $273,740 or 12.52 and the log of $669,165 or 13.41.

Because PLA projects, on average, are larger than nonPLA projects, the relative importance of project labor agreements in dollar terms shown in Figure 12, reverses what we saw in Figure 10 when we simply counted up projects by PLA and nonPLA status. While PLAs in our sample account for one-third of all projects (Figure 10), PLAs account for more than two-thirds of the value all projects in our sample. (Figure 12) The 88 PLAs in our project had a sum value of $501 million while the 175 nonPLA projects had a sum value of $206 million.

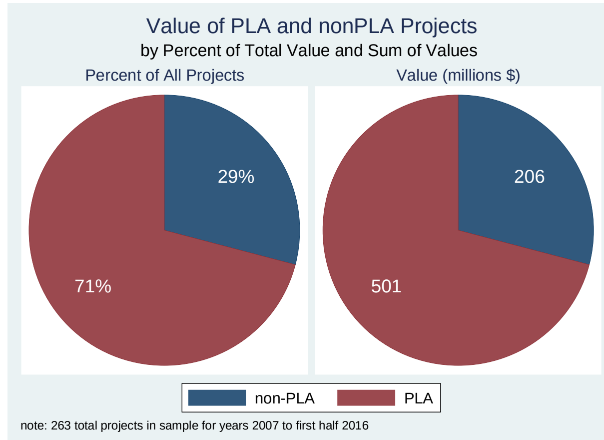


*Figure 12: Value of PLA and nonPLA projects in sample by percentage of total value and sum of value (in millions of dollars)*

The construction of community college projects within our sample vary by year. There is a general increase in projects over time with a dip in 2011 and 2012. Figure 13 shows that 6% of all the projects in our sample were bid in 2007 compared to 20% in 2014 and 20% in 2015. While there was a steady increase in work bid from 2007 to 2010 from 6% of all projects to 10% of all projects, in 2011 and 2012, just 3% of the projects in our sample were put to bid. However, the pace of expansion resumed in 2013 with 15% of all projects let out to bid in that year. Our data for 2016 are incomplete and cover just the first half of this last year in our sample.

Figure 14 shows the percent distribution of projects among the 10 community college districts in our sample. In terms of the number of projects put to bid, half of the bid openings were in Peralta and Chabot-Las Positas community college districts.

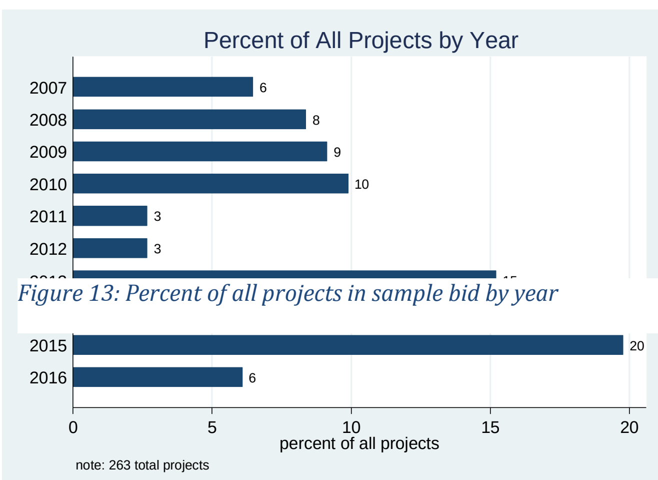


*Figure 13: Percent of all projects in sample bid by year*

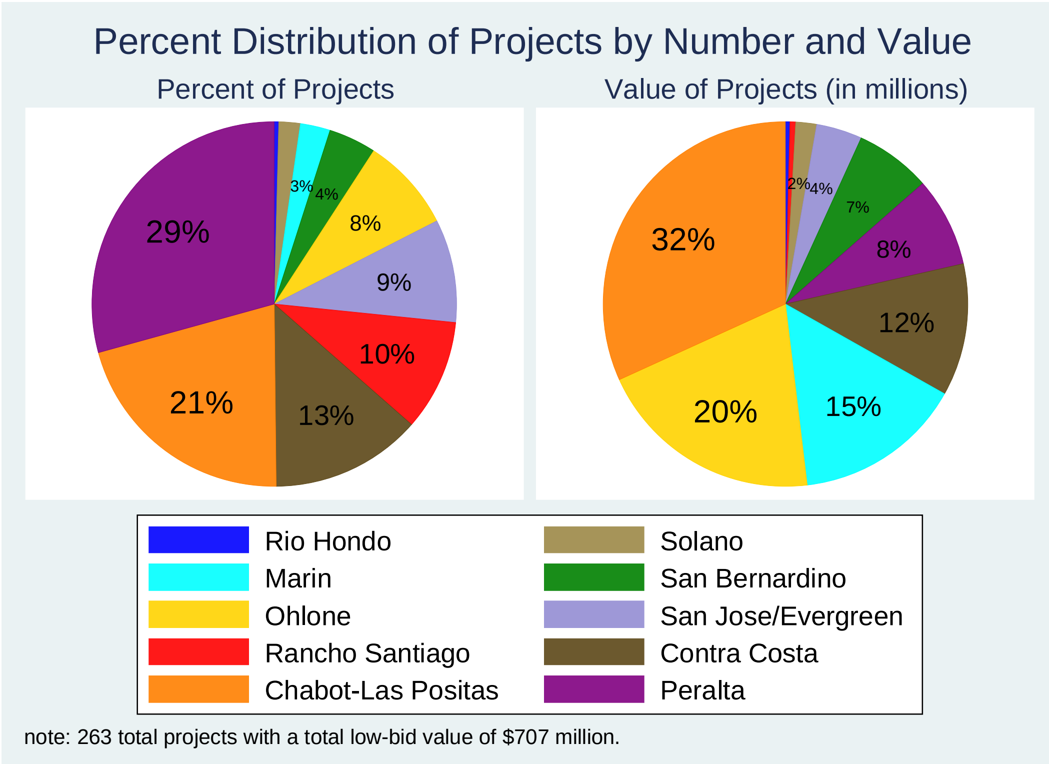


*Figure 14: Percent distribution of number and value of community college projects*

However, while Peralta had the largest number of projects—accounting for 29% of all bid openings—these projects were relatively small accounting for 8% of the total value of construction in our sample. In contrast, Chabot-Las Positas had 21% of all projects and these relatively larger projects accounted for 32% of the value of work bid. Marin Community College's 7 projects accounted for just 3% of the projects by number but 15% by value. Rancho Santiago accounted for 10% by number of projects but just 2% of the total value of projects. In our statistical regression models, we will try to control for these and other differences among the community college districts in our sample.

## Regression Model Predicting the Number of Bids on a Project

In the Appendix, in Table 5, we present the results of two linear regression models predicting the number of bids on a project (in model 1), and the log of the number of bids on a project (in model 2).[5] In both models, our focus variable is an indicator for whether the project is a project labor agreement or not. Our hypothesis is that controlling for other factors, PLAs will have fewer bidders compared to nonPLA projects.

[5] We report linear regression results because this statistical technique is widely understood. We also provide our model using poisson regressions for those preferring to treat the number of bidders as a count variable. The poisson results are technically superior to linear regression for count variables and the poisson results shown as a supplementary table in Appendix I are comparable to the linear regression results discussed here in the text.

We control for four sets of issues that also may affect the number of bidders on a project. These control factors include: 1) the size of the project, 2) the year the project was put out for bid, 3) the month the project was put out for bid, and 4) the community college district that let the project. The year variables control for both the effects of inflation/deflation in general and the Great Recession specifically. We will discuss each of these control variables first, and then look at whether the PLA status of the project also affects the number of bidders.

## Size of Project

In general, larger projects are more attractive to contractors compared to ones for at least three reasons. First, there are both fixed and variable estimation costs that must be invested in order to bid on a project. The fixed estimation costs can be more easily spread across a larger project compared to a smaller one. Second, contractor downtime is a major risk in the turbulent construction industry. Idle equipment and idle workers impose costs that can be avoided, at least temporarily, on larger projects which promise to provide work for the contractor over a longer period of time. Third, for a fixed markup, larger projects provide a larger absolute profit. While contractors may shave their markups more to win larger projects, even discounted markups on a larger project is likely to yield a higher absolute profit.

Despite the attraction of larger projects, very large projects discourage bidders for at least two reasons. First, many contractors do not have bonding capacity to handle larger projects, and thus cannot bid. Second, the risk of failure-to-perform on a large project can put the contractor's entire business at risk. Thus, when a project is large enough to put a contractor's business on-the-line, some contractors will shy away from that opportunity. So we expect that as projects go from smaller to larger, more contractors will bid on these larger projects. But as projects get even larger, we expect fewer contractors will bid on these very large projects. We need to control for this factor, in part, because PLA projects sometimes are quite large, and in our sample, PLA projects tend to be larger than nonPLA projects. (See Figure 11) We will want to separate out the potential PLA effect on the number of bidders from the project size effect.

We do this by entering into the models the value of the lowest bid and the value of the lowest bid squared. Our expectation is that in the regressions the value of the lowest bid will be positive reflecting the hypothesis that larger projects attract more bidders. But we also expect the square of the value of the lowest bid will be negative reflecting the hypothesis that ever larger projects eventually will discourage contractors from bidding. So we expect there will be a tug-of-war between the value of the lowest bid and the value of the lowest bid squared in predicting the number of bidders on a project.[6]

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[6] This is a flexible method for modeling the project size effect allowing for the squared term to be small and statistically insignificant if the size effect is linear and permitting the squared to capture the size effect if it is nonlinear.

Figure 15 shows what we found in model 1 in Table 5. From projects with a low-bid of less than $1 to up to $50 million, holding other factors constant, the model predicts that the typical number of bidders will rise from around 5 to 7 contractors. But as the projects get really large, up to $100 million, the number of bidders falls back down to about 5.5 contractors. In model 2 (not graphically shown) we get similar results where the predicted number of bidders on small projects is about 4, it rises to a peak of about 6 and then for really large projects falls back down again to about 4.2 contractors.

This is an important first step in testing whether PLAs restrict the number of bidders because now the models have an understanding of how many bidders to expect just based on the size of the project.

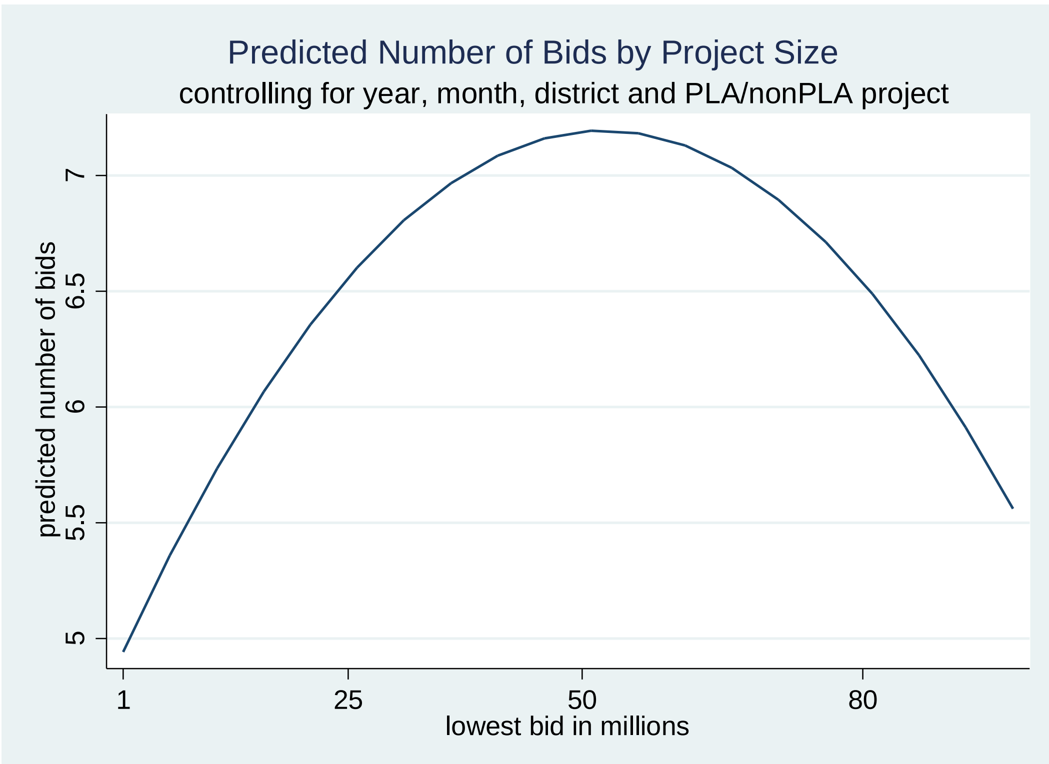


*Figure 15: Predicting the number of bidders based on the size of the project*

## Year Project Was Let to Bid

But project size is not the only determinant of how many contractors will be willing to bid on a project. It also depends upon how busy contractors are on other projects and what alternatives contractors have compared to the project at hand. This is partly determined by the construction business cycle.

The construction industry is notoriously turbulent. For instance, at the depth of the Great Recession in 2009, while the overall economy had lost 6% of all jobs, the US construction industry lost 30% of all its jobs. These booms and busts of the construction business cycle affect contractor interest in specific bid openings.

During the downturn, when prospective project opportunities are scarce, contractors crowd into the limited available opportunities increasing the number of bidders on these relatively few projects. On the other hand, during the boom, when most contractors are busy, fewer contractors will be available for any specific new project that comes on-line decreasing the number of bidders on that project.

Our sample of projects hit bottom after the overall crash in California construction during the Great Recession. Figure 13 (above) shows that new community college projects in our sample collapsed 2011 and 2012. But the overall construction market hit bottom in 2009. This was when alternatives to the available community college projects were slim. So, all other things being equal, 2009 is when we would expect there to be more bidders crowding into these public works opportunities.

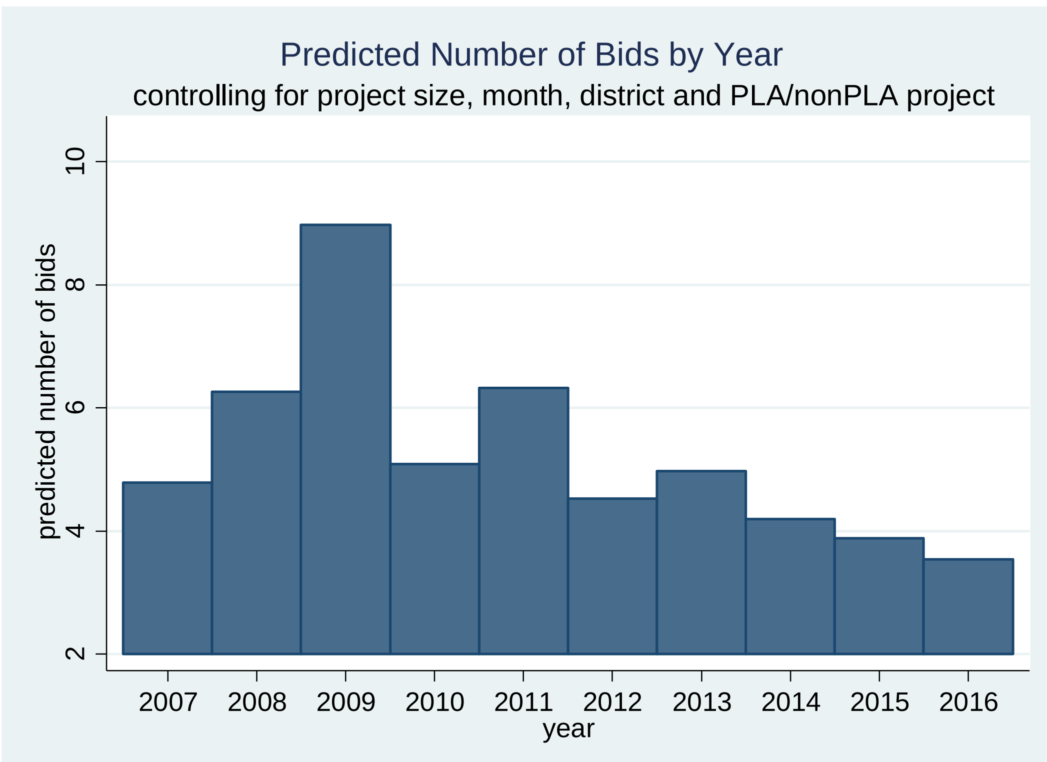


*Figure 16: Predicted number of bidders based on the year when the project was let*

Figure 16 shows the model 1 predictions for the number of contractors by year when the project was put out for bid. California construction employment peaked in 2006 and began declining in 2007 with the downturn bottoming out in 2009. The California construction economy, particularly in the Bay Area has improved since 2009 and in some areas has surpassed its previous peak.[lxxii] The model predicts that at the business cycle bottom, the number of bidders on projects rises substantially. Compared to 2014-15 where the model expects, all other things being equal, for there to be about 4 bidders on each project, in 2009, model 1 expects almost 9 contractors bidding on each community college project.

Model 2 has similar results for 2009 expect 9.2 contractors per bid opening compared to only about 3 contractors bidding on each project in 2014-15.

Thus, the year in which a project is let is an important consideration to keep in mind when analyzing the effect of PLA provisions on bid participation.

## Month the Project Was Let to Bid

Construction is a chronically turbulent industry in the grip of seasonal as well as cyclical ups and downs. The seasonal cycle is primarily driven by weather but also driven by owner requirements such as schools trying to focus their construction work in the summer educational down season. Knowing this, contractors seek to bid on projects in the spring in order to line up work in the summer. In the slack season of winter, contractors may be idle and more willing to bid on whatever projects become available. Thus, we hypothesize in the model that there will be a seasonal pattern with more bidders in the slack season lining up work and fewer bidders in the summer season when contractors are already busy.

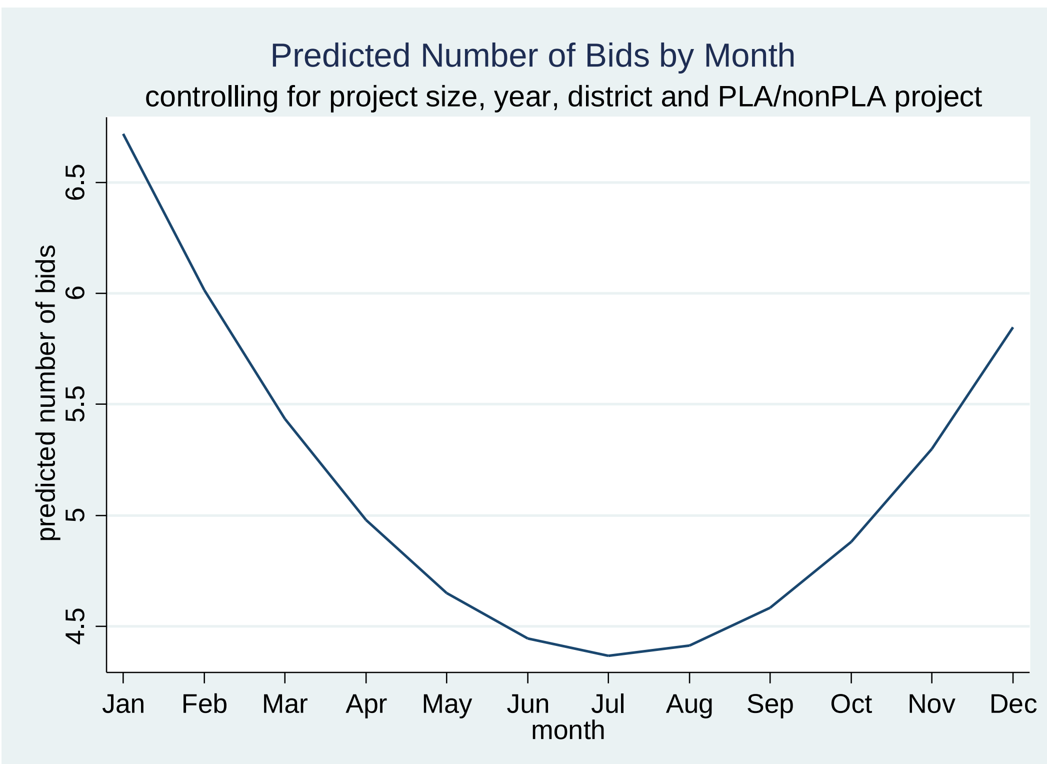


*Figure 17: Predicted number of bidders based on the month the bid was opened*

Figure 17 shows the results from model 1 in Table 5. These is a clear seasonal swing in the expected number of bidders based on the month the bid was let. In January, all other things being equal, owners can expect about 6.5 contractors bidding on their projects. In July, this expectation falls to 4.5 contractors only to rise back up to about 6 contractors per bid opening in December. Model 2 (not graphically shown) shows a similar swing from 5 expected bidders in January to 3.7 in July to 4.6 in December.

So again, keeping in mind the seasonal and cyclical patterns of bidding is an important precondition for testing the effects of PLAs on bidding behavior.[7]

## The Effect of Location on Bids

Bidding behavior is influenced by the location of a project for at least two reasons. First, like politics, all construction is local with some areas having a dense community of contractors and other areas having a sparse population of contractors. Construction workers may travel long distances for work and contractors may even willingly go farther. But when you do not have to travel and there are plenty of contractors in your area, all other things being equal, you will have more contractors bidding on a project.
Second, owners affect the number of bidders on a project in at least two ways. First, some owners pre-qualify contractors in order to allow them to bid on a project. The goal of pre-qualification is to insure that contractors bidding on a project can do the work. Prequalification may reduce the number of bidders on a project simply by excluding less qualified or unqualified contractors. Second, while some owners issue single prime contracts for their projects, others break up their projects into components and issue multiple prime contracts. In the latter case, subcontractors who would bid to a general now bid to the owner. This alters the community of contractors that will consider bidding on a project and may alter the number of bidders one can expect to participate.

In both models 1 and 2, we enter variables indicating in which community college district the project is built. We have no apriori expectation regarding where there would be more bidders, all other things being equal. Relative to Chabor Las-Positas, our reference district in the models, the striking result is that model 2 expects that Rio Hondo will have 3.4 more contractors bidding on their project while model 1 expects a whopping 8 more bidders on Rio Hondo projects. This result is probably an artifact of small sample size. Figure 14 shows that Rio Hondo has the fewest projects (3) of any district within our sample.

Contractor community density, owner bidding policies and other location specific factors can influence contractor bid participation. The joint effect of these locational variables are captured in variables indicating the location of the project. In Table 5, as long as these location factors are relatively constant within each community college district over the period 2007 to 2016, then our indicator variables for the community college districts will absorb those effects allowing us to isolate the specific effect of PLA practices on contractor bid participation.

## Project Labor Agreement Effect on Bid Participation

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[7] Substituting quarters for months and repeating the test yields similar results to those reported in both linear and poisson regressions.

Critics of PLAs argue that PLAs reduce contractor bid participation while PLA proponents argue that PLAs may encourage contractors to bid on a project. Thus, statistically we are asking what is called a "two-tailed" test—do PLAs raise bid participation or lower it?

Figure 18 shows the results of model 1 in Table 5. All other things being equal, model 1 expects that there will be almost 5 contractors bidding on nonPLA projects and about 5.3 contractors bidding on PLA projects.

But Figure 18 also includes a plus-or-minus 95% confidence interval around these point estimates. A 95% confidence interval means that if we had 100 randomly drawn samples of data, and we ran this same test again 100 times over these different data sets, we would expect that 95 of the 100 times, our test would find results within the confidence interval shown.

Notice that these two confidence intervals in Figure 18 overlap. So if we redid our sample and derived new estimates, some of the time, the model would expect more bidders on nonPLA projects compared to the PLA projects. What this basically means is that PLA practices do not affect contractor bid participation either way. PLAs neither raise nor lower contractor bid participation, at least in the case of public community college construction in California. Whether this remains true for private sector PLAs or PLAs in non-prevailing-wage-law jurisdictions remains an open question. But we can say, for this type of public construction in this regulatory environment, controlling for other factors that influence contractor bid participation, we find no evidence supporting the assertion that in general, project labor agreements either hinder or encourage contractor bid participation. Similar results are found in model 2 in Table 5.

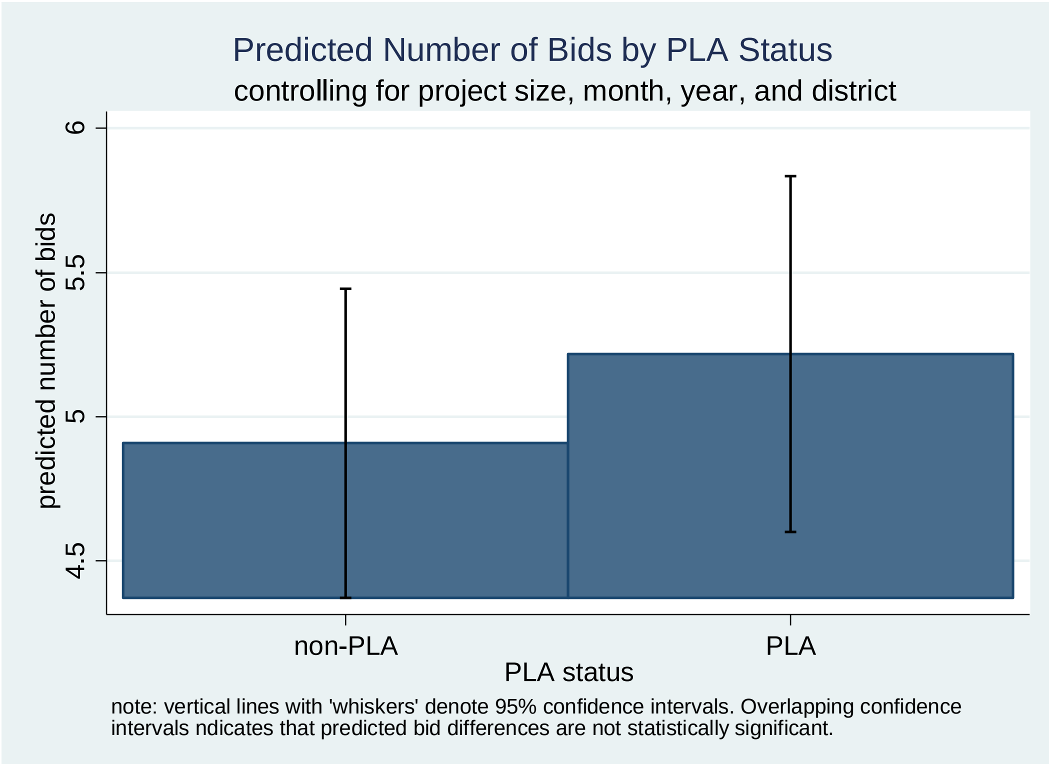


*Figure 18: Predicting the effect of PLA provisions on the number of bidders*

## Regression Model Predicting the PLA Effect on the Lowest Bid

Critics of PLAs argue that project labor agreements may raise costs, primarily because they may reduce the number of bidders and secondarily because they may raise nonunion contractor key-worker benefit costs.  Here we test these hypotheses with three nested regression models all of which predict the log of the low bid on a project based on the engineer's estimate and whether or not the project had a PLA.  All nesting means here is that models 1 and 2 in Table 6 are subsets of model 3 using some, but not all, of model 3's control variables.

We have incomplete information in our sample regarding engineer's estimates. This is partly because some projects did not have engineer's estimates and partly because we were unable to find the engineer's estimate for other projects. So out of the 263 projects in the sample, Table 6 reflects tests on a subsample of 105 projects that did have engineer's estimates. We limited the sample to districts that provided engineer's estimates for both PLA and nonPLA projects. (This eliminated 7 projects in districts which had engineer's estimates but only for either PLA projects or nonPLA projects but not both. In unreported models we included these 7 projects deriving results similar to those in Table 6.)

Recall that the left panel in Figure 11 showed that the distribution of lowest bids was "unbalanced" with lots of bids at the low end of the distribution and then a minority of low-bids trailing off toward the high end of the distribution. This skewed distribution became more balanced in the right-hand panel of Figure 11 when the log of the lowest bid was graphed. Having a balanced or more normal distribution for the lowest bid has statistical properties that make for a better test of the effect of various factors including PLAs on the low-bid outcome.

Model 1 in Table 6 is simple. It predicts the log of the lowest bid with the engineer's estimate and whether or not the project was a PLA. We expect the engineer's estimate to be a very good but not perfect predictor of what the low bid will eventually be. In model 1 we actually use the log of the engineer's estimate. Put in this form, the estimated effect of the engineer's estimate is an economy-of-scale effect (or what economists like to call an "elasticity"). In Table 6, model 1, the estimated effect of the log of the engineer's estimate on the log of the lowest bid is .98. what this means is—double the size of the engineer's estimate of the cost of a project, and subsequently the lowest bid will almost but not quite double. It will go up not by 98%. Double the engineer's estimate and the eventual low bid will go up by another 98%. If the engineer's estimate goes up by 10%, you can expect the eventual low bid to go up by 9.8%. This estimate is strongly statistically significant and in unreported experiments with other possible forms of the relationship of the engineer's estimate to the low bid, we found that this economy-of-scale or elasticity relationship was the strongest.

In model 1, the estimate of the effect of PLAs on the lowest bid was .03. This means that controlling for the engineer's estimate, PLAs raised the price of the lowest bid by 3%. This is in line with but at the low-end of what PLA critics argue. However, this effect is not statistically significant. This means that at all standard levels, we must reject the hypothesis that there is a real PLA effect on the low bid. This is in line with the results in Table 5 which failed to find a PLA effect on bidder participation.

But model 1 is a simple model. In model 2, Table 6, we add in the year the project was bid. When we do this, the accuracy of the engineer's estimate improves slightly rising from .98 to .99—raise the engineer's estimate by 10% and the lowest bid will rise by 9.9%. Most of the years were statistically insignificant (the asterisks indicate statistical significance with more asterisks indicating stronger statistical significance). But one year does stand out—2009. At the bottom of the great recession, controlling for the engineer's estimate and whether or not the project was a PLA, projects were coming in roughly 25% lower than in 2007—the base or reference year in the model. (The year variables also capture inflationary and deflationary construction cost effects associated with time in general and the Great Recession in particular.)

In model 2, the PLA effect switched from positive to negative—a minus .03. This means that controlling for the engineer's estimate, PLAs lowered the price of the lowest bid by 3%. But again—no asterisks and no statistical significance for the estimate. This again means that at all standard levels, we must reject the hypothesis that there is a real PLA effect on the low bid.

In model 3, we include location effects: the engineer's estimate becomes a little more accurate, the 2009 Great Recession effect becomes slightly smaller and the PLA effect is still a minus 3% with no associated statistical significance.

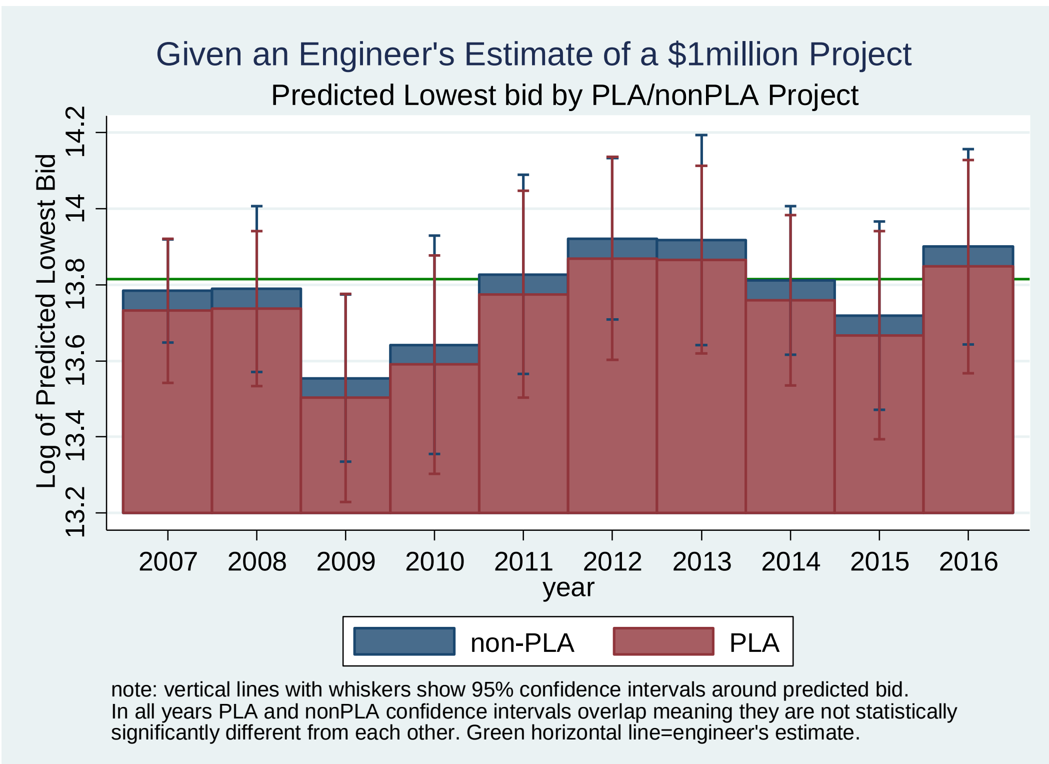


*Figure 19: Predicting the value of the lowest bid: model 3*

Figure 19 provides a graphical representation of the results in model 3 of Table 6. The horizontal axis shows years and the vertical axis shows the log of the predicted value of the lowest bid. The red bars show the predicted value of the lowest bid by year for PLA projects while the blue bars (which are behind the red bars) show the predicted value of the lowest bid by year for nonPLA projects. The vertical lines with caps show the 95% confidence intervals for the PLA and non PLA projects. These lines overlap in every case indicating that the PLA and nonPLA project effects on the lowest bid are essentially the same. This set of predictions in Figure 19 are for an engineer's estimate of $1 million or its equivalent log value of 13.82 shown on the vertical axis as a green horizontal line. In all years except 2009, the 95% confidence interval vertical lines with caps cross the green line. This means for these years we cannot say that bids were coming in statistically significantly below the engineer's estimate. However, in 2009, the 95% confidence intervals for both PLA and nonPLA projects are below the engineer's estimate indicating that in that year bids were coming in significantly (and substantially) below what one would expect from an engineer's estimate of $1 million for the project.

We conclude that in the case of project labor agreements on community college projects in prevailing wage jurisdictions such as California, there is no statistically significant PLA effect on the lowest bid either raising or lowering the price of the project. This then simplifies the public construction procurement policy issue for construction projects similar to ones found at community colleges and in jurisdictions similar to California. PLAs should only be agreed to by public agencies if the PLA has attractive provisions and/or provides attractive construction services relative to prevailing wage jobs not covered by PLAs. However, it is neither indicated nor necessary to assume that PLAs will restrict bid competition or raise (or indeed lower) the lowest bid relative to the engineer's estimate.

## Conclusions and Limitations

The College of Marin project labor agreement helped manage the construction of three large projects built on-time and within budget. Local Marin County construction workers were given preference in dispatching to the job sites and five College of Marin students worked on the PLA projects, a first step towards entering into a system of registered apprenticeship training that, if completed, can lead to about a $300,000 increase in lifetime earnings.

Nearby contractors who bid on the three Marin PLA projects and also tended to bid on the four smaller nonPLA projects. However, contractors who came from long distances tended to bid either on the PLA projects or the nonPLA projects but not both. Both the PLA and nonPLA projects came in at about the same percentage amount below the engineer's estimate although in dollar terms, because the PLA projects were larger, the low bids were much below the dollar discounts relative to the engineer's estimates found on the smaller nonPLA projects. While two of the nonPLA projects had cost overruns, these appear to be associated with design and engineering issues and not problems with onsite construction.

Our analysis of 263 California community college projects built between 2007 and 2016, 88 of which were built under PLA arrangements, found results similar to our College of Marin case study. In comparison to nonPLA projects, controlling for the size of the project and when it was put out for bid, PLAs did not decrease the number of bidders nor did PLAs raise prices relative to the engineer's estimates.

Both case studies and statistical analyses have limitations. Case studies are rich in detail, context and nuance, but raise the question of the extent to which a limited number of specific cases can be extended to other circumstances. Statistical analysis is limited by simplification inherent in reducing complex human activity into numbers. We have sought to balance these contrasting limitations by presenting together a case study with a broader statistical view of many more similar projects.

However, partly because this is the first study of the effects of PLAs on the number of bidders, and the relation of bidding to engineer's estimates, and partly because this study focused on community college construction in California, more research needs to be done on this topic. We would like to know whether these results would replicate in other states with prevailing wage laws, in states without prevailing wage laws, in states with greater or lesser construction union density, and on civil engineering or residential projects that may differ from construction activity typical at community colleges.

While we await this research, we provisionally conclude that project labor agreements may be a useful risk-management tool on some construction sites; and PLAs may be a useful means whereby owners can harvest greater advantages from their control of significant amounts of construction work. Evidence does not support the contention that PLAs reduce the number of bidders or raise low-bid prices on community colleges in California.

## Appendix I: REGRESSION PREDICTING NUMBER OF BIDS

*Table 5: Predicting number of bids by project size, year, month, college district and PLA/non-PLA status*

Predicting Number of Bids by Project Size, Year, Month, College District and PLA/non-PLA

| | (1) number of bids (linear regression) | t-statistic | (2) log of number of bids (linear regression) | t-statistic |
|---|---|---|---|---|
| PLA Project | 0.309 | (0.64) | 0.189 | (1.62) |
| Lowest Bid (in millions $) | 0.0895 | (1.63) | 0.0174* | (1.68) |
| Lowest Bid squared (in millions $) | -0.000856* | (-1.91) | -0.000172** | (-2.02) |
| month | -0.891*** | (-2.72) | -0.119** | (-2.07) |
| month squared | 0.0625*** | (2.73) | 0.00857** | (1.98) |
| year=2007 | -4.187*** | (-4.84) | -0.706*** | (-4.14) |
| year=2008 | -2.717** | (-2.57) | -0.455*** | (-2.71) |
| year=2009 | 0 | (.) | 0 | (.) |
| year=2010 | -3.883*** | (-3.75) | -0.736*** | (-4.00) |
| year=2011 | -2.653* | (-1.93) | -0.543* | (-1.68) |
| year=2012 | -4.451*** | (-3.91) | -1.020*** | (-3.32) |
| year=2013 | -4.000*** | (-3.76) | -0.925*** | (-4.97) |
| year=2014 | -4.785*** | (-5.33) | -1.015*** | (-5.93) |
| year=2015 | -5.094*** | (-5.78) | -1.139*** | (-6.48) |
| year=2016 | -5.433*** | (-5.41) | -1.073*** | (-4.72) |
| Chabot-Las Positas | 0 | (.) | 0 | (.) |
| Marin | -0.0730 | (-0.08) | 0.0746 | (0.48) |
| Contra Costa | -1.080 | (-1.28) | 0.0673 | (0.37) |
| Ohlone | -1.864* | (-1.88) | -0.315 | (-1.41) |
| Peralta | -2.244*** | (-3.27) | -0.374*** | (-2.89) |
| Rancho Santiago | -0.00808 | (-0.01) | 0.176 | (0.79) |
| Rio Hondo | 7.911*** | (7.69) | 1.244*** | (5.76) |
| San Bernardino | 1.665 | (1.25) | 0.575** | (2.53) |
| San Jose/Evergreen | -1.867** | (-2.00) | -0.168 | (-0.92) |
| Solano | -2.030** | (-2.01) | -0.410 | (-1.23) |
| Constant | 12.32*** | (8.61) | 2.551*** | (11.84) |
| Observations | 263 | | 263 | |
| $R^2$ | 0.367 | | 0.320 | |

*t* statistics in parentheses
$^{*}$ $p < 0.10$, $^{**}$ $p < 0.05$, $^{***}$ $p < 0.01$

Predicting Number of Bids by Project Size, Year, Month, College District and PLA/non-PLA (Supplementary Poisson Regression)

| | (1)<br>number of bids (poisson regression) | t-statistic | (2)<br>log of number of bids (poisson regression) | t-statistic |
|---|---|---|---|---|
| PLA Project | 0.0471 | (0.48) | 0.135 | (1.54) |
| Lowest Bid (in millions $) | 0.0146* | (1.87) | 0.00955 | (1.64) |
| Lowest Bid squared (in millions $) | -0.000168** | (-2.44) | -0.000114** | (-2.21) |
| month | -0.173*** | (-3.15) | -0.0836** | (-2.17) |
| month squared | 0.0123*** | (3.14) | 0.00604** | (2.09) |
| year=2007 | -0.719*** | (-5.43) | -0.444*** | (-4.12) |
| year=2008 | -0.457*** | (-3.10) | -0.294*** | (-3.11) |
| year=2009 | 0 | (.) | 0 | (.) |
| year=2010 | -0.614*** | (-4.06) | -0.452*** | (-4.13) |
| year=2011 | -0.417** | (-2.28) | -0.340* | (-1.93) |
| year=2012 | -0.779*** | (-3.51) | -0.703*** | (-2.79) |
| year=2013 | -0.680*** | (-3.82) | -0.623*** | (-4.75) |
| year=2014 | -0.855*** | (-5.54) | -0.701*** | (-5.57) |
| year=2015 | -0.940*** | (-6.19) | -0.807*** | (-6.00) |
| year=2016 | -0.982*** | (-5.30) | -0.744*** | (-4.28) |
| Chabot-Las Positas | 0 | (.) | 0 | (.) |
| Marin | -0.0414 | (-0.37) | 0.0308 | (0.36) |
| Contra Costa | -0.156 | (-0.92) | 0.105 | (0.73) |
| Ohlone | -0.334* | (-1.66) | -0.210 | (-1.19) |
| Peralta | -0.405*** | (-3.62) | -0.254*** | (-3.00) |
| Rancho Santiago | 0.0826 | (0.40) | 0.183 | (1.08) |
| Rio Hondo | 0.898*** | (4.41) | 0.702*** | (4.28) |
| San Bernardino | 0.331 | (1.53) | 0.421*** | (2.75) |
| San Jose/Evergreen | -0.319* | (-1.78) | -0.0731 | (-0.54) |
| Solano | -0.435 | (-1.56) | -0.339 | (-0.91) |
| Constant | 2.860*** | (14.40) | 1.075*** | (8.30) |
| Observations | 263 | | 263 | |

*t* statistics in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

## Appendix II: REGRESSION PREDICTING LOW BID

*Table 6: Predicting log of lowest bid with engineer's estimate PLAs/non-PLAs, year and college district*

| | (1) | (2) | (3) |
|---|---|---|---|
| Log of engineer's estimate | 0.9817*** | 0.9930*** | 0.9978*** |
| | (55.10) | (42.00) | (38.78) |
| PLA Project | 0.0309 | -0.0315 | -0.0287 |
| | (0.37) | (-0.36) | (-0.31) |
| year=2007 | | 0.0000 | 0.0000 |
| | | (.) | (.) |
| year=2008 | | 0.0008 | 0.0051 |
| | | (0.01) | (0.06) |
| year=2009 | | -0.2520*** | -0.2294** |
| | | (-2.94) | (-2.42) |
| year=2010 | | -0.1442 | -0.1418 |
| | | (-1.11) | (-1.06) |
| year=2011 | | 0.0383 | 0.0433 |
| | | (0.32) | (0.37) |
| year=2012 | | 0.2118 | 0.1373 |
| | | (1.39) | (1.05) |
| year=2013 | | 0.1565 | 0.1338 |
| | | (1.20) | (0.97) |
| year=2014 | | 0.0713 | 0.0274 |
| | | (0.81) | (0.25) |
| year=2015 | | 0.0350 | -0.0647 |
| | | (0.34) | (-0.40) |
| year=2016 | | 0.2223* | 0.1160 |
| | | (1.82) | (0.71) |
| Chabot-Las Positas Community College District | | | 0.0000 |
| | | | (.) |
| College of Marin Community College District | | | -0.0875 |
| | | | (-1.04) |
| Contra Costa Community College District | | | 0.1256 |
| | | | (0.84) |
| Ohlone Community College District | | | 0.0383 |
| | | | (0.30) |
| Solano Community College District | | | 0.1136 |
| | | | (0.67) |
| Constant | 0.1806 | 0.0157 | -0.0485 |
| | (0.74) | (0.05) | (-0.14) |
| Observations | 105 | 105 | 105 |
| $R^2$ | 0.966 | 0.969 | 0.970 |

note: includes only districts with engineers estimates and both PLAs/nonPLAs
t-statistics in parentheses
$^{*}$ $p < 0.10$, $^{**}$ $p < 0.05$, $^{***}$ $p < 0.01$

## Appendix III: COLLEGE OF MARIN BID DATA

| PLA | Project | Bidding Contractors | Result | Bid | Con. Home |
|---|---|---|---|---|---|
| yes | Science Math Complex | Lathrop Construction | won | 34,040,000 | Benicia |
| yes | Science Math Complex | Roebbelen Construction | lost | 35,380,000 | El Dorado Hills |
| yes | Science Math Complex | SJ Amoroso | lost | 35,817,000 | Redwood Shores |
| yes | Science Math Complex | C Overaa Construction | lost | 36,347,000 | Richmond |
| yes | Science Math Complex | McCarthy Building Companies | lost | 37,050,000 | San Francisco |
| yes | Science Math Complex | Howard S Wright Constructors | lost | 37,794,912 | Emeryville |
| yes | Science Math Complex | Wright Contracting | lost | 38,847,000 | Santa Rosa |
| yes | Indian Valley Complex | Gonsalves & Stronck | lost | 13,288,000 | San Carlos |
| yes | Indian Valley Complex | Di Giorgio Contracting | won | 13,350,000 | Novato |
| yes | Indian Valley Complex | Arntz Builders | lost | 13,460,342 | Novato |
| yes | Indian Valley Complex | JW & Sons | lost | 13,632,000 | Petaluma |
| yes | Indian Valley Complex | Roebbelen Construction | lost | 13,743,000 | El Dorado Hills |
| yes | Indian Valley Complex | Alten Construction | lost | 13,768,246 | Richmond |
| yes | Indian Valley Complex | SJ Amoroso | lost | 13,897,000 | Redwood Shores |
| yes | Indian Valley Complex | Jeff Luchetti Construction | lost | 14,031,000 | Santa Rosa |
| yes | Gateway Center | Wright Contracting | won | 18,995,000 | Santa Rosa |
| yes | Gateway Center | Lathrop Construction | lost | 19,112,000 | Benicia |
| yes | Gateway Center | Alten Construction | lost | 19,246,000 | Richmond |
| yes | Gateway Center | SJ Amoroso | lost | 19,327,000 | Redwood Shores |
| yes | Gateway Center | Midstate Construction | lost | 19,803,040 | Petaluma |
| yes | Gateway Center | Roebbelen Construction | lost | 20,780,000 | El Dorado Hills |
| yes | Trans. Tech. Center | ProWest Construction | lost | 21,150,000 | |
| no | Trans. Tech. Center | Alten Construction | won | 6,895,000 | Richmond |
| no | Trans. Tech. Center | West Bay Builders | lost | 6,897,000 | Novato |
| no | Trans. Tech. Center | JW & Sons | lost | 6,999,000 | Petaluma |
| no | Trans. Tech. Center | Jeff Luchetti Construction | lost | 7,047,000 | Santa Rosa |
| no | Trans. Tech. Center | Gonsalves & Stronck | lost | 7,104,000 | San Carlos |
| no | Trans. Tech. Center | Arntz Builders | lost | 7,228,248 | Novato |
| no | Trans. Tech. Center | Di Giorgio Contracting | lost | 7,465,000 | Novato |
| no | Trans. Tech. Center | PAGE Construction | lost | 7,641,000 | Novato |
| no | Performing Arts Center | Midstate Construction | won | 10,217,000 | Petaluma |
| no | Performing Arts Center | Arntz Builders | lost | 10,786,465 | Novato |
| no | Performing Arts Center | Alten Construction | lost | 10,915,000 | Richmond |
| no | Performing Arts | Jeff Luchetti Construction | lost | 11,090,000 | Santa Rosa |

| | | | | | |
|---|---|---|---|---|---|
| | Center | | | | |
| no | Performing Arts Center | Lathrop Construction | lost | 11,230,000 | Benicia |
| no | Performing Arts Center | Menghetti Construction | lost | 11,275,000 | Modesto |
| no | Performing Arts Center | Bobo Construction | lost | 11,831,000 | Elk Grove |
| no | Performing Arts Center | Younger General Contractors | lost | 11,935,000 | Rancho Cordova |
| no | Performing Arts Center | Biltwell Dev | lost | 12,189,000 | San Francisco |
| no | Fine Arts Kentfield | Alten Construction | won | 11,872,601 | Richmond |
| no | Fine Arts Kentfield | Jeff Luchetti Construction | lost | 12,290,615 | Santa Rosa |
| no | Fine Arts Kentfield | Wright Contracting | lost | 12,305,000 | Santa Rosa |
| no | Fine Arts Kentfield | West Coast Contractors | lost | 12,446,000 | Fairfield |
| no | Fine Arts Kentfield | Midstate Construction | lost | 12,526,000 | Petaluma |
| no | Fine Arts Kentfield | West Bay Builders | lost | 12,580,000 | Novato |
| no | Fine Arts Kentfield | C Overaa Construction | lost | 12,999,000 | Richmond |
| no | Fine Arts Kentfield | McCrary Construction | lost | 13,198,801 | Belmont |
| no | Fine Arts Kentfield | Di Giorgio Contracting | lost | 13,725,000 | Novato |
| no | Fine Arts Kentfield | ZCON Builders | lost | 13,829,000 | Roseville |
| no | Fine Arts Kentfield | Codding Construction Co | lost | 14,765,800 | Santa rosa |
| no | Fine Arts Kentfield | Ralph Larsen & Sons | lost | 14,890,000 | San Mateo |
| no | Diamond PE Complex | Alten Construction | won | 10,396,307 | Richmond |
| no | Diamond PE Complex | West Bay Builders | lost | 11,385,000 | Novato |
| no | Diamond PE Complex | Di Giorgio Contracting | lost | 11,492,000 | Novato |
| no | Diamond PE Complex | NBC General Contractors Corp. | lost | 11,865,000 | Oakland |
| no | Diamond PE Complex | Arntz Builders | lost | 11,944,202 | Novato |
| no | Diamond PE Complex | Bobo Construction | lost | 12,396,000 | Elk Grove |
| no | Diamond PE Complex | R Debbelen | lost | 12,510,000 | |
| no | Diamond PE Complex | Midstate Construction | lost | 13,065,000 | Petaluma |
| no | Diamond PE Complex | Zolman Construction | lost | 13,865,000 | San Carlos |

## APPENDIX IV: DATA COLLECTION METHODS

We began data collection for this report with a list of California community colleges districts that have enacted PLAs.[lxxiii] Colleges with extensive bid information posted online were prioritized for review.[8] Some community colleges posted bid information on a purchasing webpage or a webpage with information for contractors.[lxxiv] Information for other districts was accessible through online bid management software.[lxxv] For a few colleges, we found bid tabulation information interspersed within Board of Trustees meeting minute archives.[lxxvi]

We used bid tabulation sheets to record the title of each project, the total number of bidders on a project, the amount of each bid, the date of the bid, and the name and location of each contractor that submitted a bid. Bid advertisements and project information documents were sources for engineer's estimates and whether or not a PLA was used on the project. We also gathered sign-in sheets for pre-bid meetings and job walks. We used these sheets to record the names and locations of contractors that attended pre-bid meetings, the total number of attendees, and the dates of the meetings.

There was various missing information for all community colleges. One resource for filling in missing information was the California Department of Industrial Relations Public Works website.[9] The site provided information on the winning contractor of each project and whether or not the project fell under a PLA. However, this online database did not go back prior to 2015, excluding a large portion of our sample. As a final resource for missing information, we contacted the colleges themselves. In some cases, we used Public Records Act requests to formalize the process of data retrieval. Officials at every college we contacted were helpful and attentive to our requests for project information.

A vital component of our research could not be addressed through the channels mentioned above: the union status of contractors. We gathered union status information through a patchwork of sources. For many contractors, we simply called the firm and asked if they identified as union or non-union. This method was not only time-consuming, but also impractical for contractors that had ceased conducting business or did not have a working phone number.

Another method of identifying the union status of contractors was through a web search of member lists. We collected lists of signatory contractors posted on local trade union websites.[lxxvii,lxxviii,lxxix] We designated listed contractors as "union." Similarly, we used member lists from the California chapters of the anti-union group Associated Builders and Contractors (ABC) to designate contractors as "non-union." The current ABC member lists are not publicly available. Nevertheless, some archived membership directories could be

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8 Chabot-Las Positas Community College, Community College of Marin, Hartnell Community College, Ohlone Community College District, Peralta Community College, San Bernardino Community College, San Jose/Evergreen Community College, Solano Community College, Contra Costa Community College District, Rio Hondo Community College, Rancho Santiago Community College

9 http://www.dir.ca.gov/public-works/publicworks.html

found online.[lxxx, lxxxi] In addition, some ABC chapters posted a snapshot of members on their homepages. [lxxxii, lxxxiii]

The Blue Book Building and Construction Network[10] was also used to fill-in the union status of contractors. The database of companies and manufacturers includes information pages on specific contractors, including their union status. While the site provided a significant amount of information, many contractors were either not on the site, or left their union status information blank. Finally, we reached out to local union officials to review our list of contractors and fill-in the status of those they knew. In some cases, the unions also provided more expansive member lists than what was attainable through an online search.

All lists and sources functioned as a crosscheck of the information we collected. In some cases the information was contradictory, with a contractor listed as union by one source and non-union by another. For these contractors it often appeared the contractor was signatory to a trade union for some categories of construction labor, but not others. We designated such contractors as "union."

The data were compiled in Microsoft Excel and analyzed in Stata: Data Analysis and Statistical Software.

[10] http://www.thebluebook.com/

[i] Kimberly Johnston-Dodds, *Constructing California: A Review of Project Labor Agreements*, California Research Bureau, California State Library, OCTOBER 2001 CRB 01-010 https://www.library.ca.gov/crb/01/10/01-010.pdf (accessed September 30, 2016)

[ii] Kevin Dayton, "Copies of All Project Labor Agreements on California Government Projects, 1993-Present," Labor Issues Solutions, LLC. September 29, 2016 http://laborissuessolutions.com/list-of-all-project-labor-agreements-imposed-on-government-projects-california-1993-2012/ (accessed September 30, 2016)

[iii] State of California Department of Industrial Relations Division of Apprenticeship Standards 2015 Legislative Report https://www.dir.ca.gov/DAS/reports/2015LegReport.pdf ; U.S. Internal Revenue Service Exempt organizations business master file extract (eo bmf) https://www.irs.gov/charities-non-profits/exempt-organizations-business-master-file-extract-eo-bmf (accessed October 21, 2016); US Bureau of Labor Statistics, State and Metro Area Employment, Hours, & Earnings, SAE Databases http://www.bls.gov/sae/data.htm (accessed October 21, 2016)

[iv] US Bureau of labor Statistics, State Occupational Injuries, Illnesses, and Fatalities http://www.bls.gov/iif/oshstate.htm (accessed October 21, 2016)

[v] US Bureau of labor Statistics, State Occupational Injuries, Illnesses, and Fatalities, Table 6. Incidence rates1 of nonfatal occupational injuries and illnesses by industry and case types, California, 2014 http://www.bls.gov/iif/oshwc/osh/os/pr146ca.pdf

[vi] Reed, Debbie, et al. (2012). An Effectiveness Assessment and Cost-Benefit Analysis of Registered Apprenticeship in 10 States. Oakland, CA: Mathematica Policy Research. https://www.mathematica-mpr.com/our-publications-and-findings/publications/an-effectiveness-assessment-and-costbenefit-analysis-of-registered-apprenticeship-in-10-states (accessed October 21, 2016)

[vii] California, Employment Development Department, Employment by Industry Data, "Historical Annual Average Data," California, 1990-2015 http://www.labormarketinfo.edd.ca.gov/data/employment-by-industry.html (accessed October 21, 2016)
(accessed September 11 2016)

[viii] California, Employment Development Department, Employment by Industry Data, "Historical Annual Average Data," California, 1990-2015 http://www.labormarketinfo.edd.ca.gov/data/employment-by-industry.html
(accessed September 11 2016)

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