

**The Release of Davis-Bacon Certified Payroll Records, Exemption 4 of the
Freedom of Information Act, and the Question of Competitive Harm to
Contractors**

Kevin Duncan, Ph. D.
Professor of Economics
Hasan School of Business
Colorado State University-Pueblo
2200 Bonforte Blvd.
Pueblo, Colorado 81001
Phone: 719.538.6086
Fax: 719.549.2909
E-mail: kevin.duncan@csupueblo.edu

Jeffrey Waddoups, Ph. D.
Professor of Economics
Department of Economics
University of Nevada, Las Vegas
4505 South Maryland Parkway
Las Vegas, NV 89154-6005
Phone: 702-895-3497
Fax: 702-895-1354
E-mail: Jeffrey.Waddoups@unlv.edu

June 1, 2016

I. Introduction

The Davis-Bacon Act requires that workers employed on federally funded construction projects be paid no less than the wages and benefits that prevail for similar workers in the area.¹ Federal contractors are required to submit weekly certified payroll statements to demonstrate compliance with the wage policy. Certified payrolls contain detailed information that identifies each employee, their hours worked, and earnings. Third-party requests for this information have been denied under Exemption 4 of the Freedom of Information Act that protects “trade secrets and commercial or financial information obtained from a person [that is], privileged and confidential.”² In addition to encouraging the submission of complete and reliable information, Exemption 4 affords protection from substantial competitive harm that may occur if disclosure would allow a competitor to modify its business at the expense of the submitter. Recent decisions have been based on affidavits indicating that the labor cost information contained in certified payrolls is a significant element of a contractor’s bid and releasing this information would allow a competitor to undercut future bids. The present study is a case-specific inquiry into the nature of the construction industry to determine if the specific claims regarding the potential for competitive disadvantage associated with the release of certified payrolls are relevant to the industry.

Part I of the study continues with a description of the Davis-Bacon and Related Acts, the motivation for third-party requests for certified payrolls, and a review of recent court decisions

¹ See Davis-Bacon and Related Acts, Wage and Hour Division of the U.S. Department of Labor. Accessed at: <http://www.dol.gov/whd/govcontracts/dbra.htm>.

² See the “DOJ Guide to the Freedom of Information Act” (2009 edition), U.S. Department of Justice Guide to the Freedom of Information Act. Accessed at: <http://www.justice.gov/oip/doj-guide-freedom-information-act>.

regarding the justification for redacting requested information under Exemption 4. Data from the U.S. Census Bureau's Economic Census of Construction are used to address the claim that labor costs are a significant element of bid prices.

In Part II certified payroll data for projects covered by the City of Denver prevailing wage policy are examined. Previous judgments were made in the absence of a detailed examination of certified payrolls. This study conducts such an examination. These data, coupled with a review of the research on bidding in the construction industry, illustrate how numerous factors cause the labor hour estimates used in bid preparation to deviate from the hours that are reported in certified payrolls. Payroll data are also used to address concerns that the job classification and hours worked data contained in a certified payroll may reveal confidential information (trade secrets) about how a contractor employs workers from different trades.

Part III illustrates the detailed information about construction bids that is available to the public. State departments of transportation provide detailed bid results including the name and bid of the winning contractor. This information is far more accurate and useful in gaining knowledge about winning bids than the labor cost information that is reported in a certified payroll. This information is routinely released without apparent competitive harm to contractors. The State of California passed legislation in 2014 providing public access to certified payroll records for construction projects funded by the state. Through a searchable data base, the public may view and print certified payrolls with employee names, addresses and social security numbers redacted. It is too early to empirically determine if the policy change is affecting bids and resulting in competitive harm. However, it is clear that with access to certified payrolls, employees can easily, anonymously, and without fear of retaliation compare their wage

payments from a public works contractor to the hours and earnings certified and reported by their employer.

A. Davis-Bacon and Related Acts

The purpose of the Davis-Bacon Act is to ensure that construction workers will not see their wages and benefits undercut as a result of government spending practices.³ The infusion of federal dollars into an area, along with a process that rewards low bids, may depress wages by attracting contractors from other areas. These contractors may undercut local wage rates by importing lower paid employees or by offering less pay to local workers. By protecting local compensation standards the Davis-Bacon Act establishes a level playing field for all contractors bidding on federally funded projects.

The Department of Labor's Wage and Hour Division determines local prevailing wage and fringe benefit rates through surveys conducted in the civil subdivision of every state where federally funded work is performed.⁴ The civil subdivision is typically the county unless insufficient data are available. In such cases counties are combined into groups until sufficient data are obtained. Surveys are dependent upon the voluntary submission of information from contractors and other parties that have performed construction work within the time frame and geographic scope of the wage survey. Wage and benefit information is collected for the detailed job classifications involved in building, residential, highway, and heavy construction. If a majority of the workers in a classification are paid the same, that rate is the prevailing wage. If there is no majority wage rate, the average of the wages paid, weighted by the total employed in

³ See The Davis-Bacon Act Protecting Wage Equality Since 1931. Accessed at: <http://www.dol.gov/whd/programs/dbra/Survey/conformancefaq.htm>.

⁴ For a detailed description of the survey process see *Davis-Bacon Surveys*, Prevailing Wage Resource Book 2010, U.S. Department of Labor. Accessed at: <http://www.dol.gov/whd/recovery/pwrp/Tab12DBSurveys.pdf>.

that classification, is the prevailing wage.⁵ A similar method is used to determine prevailing benefit rates. Compensation rates for unionized construction workers prevail if these rates are the majority. Otherwise, union rates influence prevailing rates through the determination of the average wage. Prevailing wages apply for every covered construction contract with the federal government that is in excess of \$2,000.

The Copeland Act provides enforcement and monitoring of the Davis-Bacon Act by requiring that all prime and sub contractors employed on federal construction projects submit weekly certified payroll records to the contracting agency.⁶ Payroll records must include each employee's name, last four digits of their social security number, job classification, daily and weekly hours worked, wage rate, gross earnings, fringe benefits, deductions and net earnings.⁷ Federal agencies and departments have responsibility to ensure that Davis-Bacon prevailing wage rates are applied where required. Oversight at the departmental level typically includes the; 1) provision of education, basic training, and technical support to ensure that contractors understand their obligations; 2) monitoring of contractor compliance by reviewing certified payrolls submissions; 3) investigation of probable violations and complaints of underpayment; and 4) pursuing sanctions, including debarment against repeat violators of the wage policy.⁸

B. Freedom of Information Act: Exemptions 4 and 6

⁵ Davis-Bacon prevailing wage rates are reported at Wage Determinations On-Line.gov. Accessed at: <http://www.wdol.gov/>.

⁶ See “The Copeland “Anti-Kickback” Act, U.S. Department of Labor. Accessed at: <http://www.dol.gov/compliance/laws/comp-copeland.htm>.

⁷ See Form WH347 accessed at: <http://www.dol.gov/whd/forms/wh347.pdf>.

⁸ See for example, “Making Davis-Bacon Work. A Practical Guide for State, Indian Tribe, and Local Agencies.” Labor Relations Desk Guide LR01.DG, U.S. Department of Housing and Urban Development, September 2011. <http://portal.hud.gov/hudportal/documents/huddoc?id=makingdavisbaconwork001.pdf>.

Certified payrolls are made available for inspection by the federal or state contracting officer and by authorized representatives of the U.S. Department of Labor. Parties may gain access to the certified payrolls by submitting a Freedom of Information Act (hereinafter, FOIA) request to the appropriate contracting agency. FOIA was enacted in 1966 to establish a right of access to official information and to create full disclosure unless the requested information is exempted. There are nine exemptions.⁹ This study is concerned primarily with Exemption 4 and to some extent with Exemption 6. Exemption 4 protects against the release of trade secrets and commercial or financial information that is privileged or confidential. This protection is intended to encourage submitters to furnish accurate and reliable information. The exemption protects submitters from competitive disadvantages that results from the disclosure of information. Numerous types of competitive injury have been identified by the courts, including the harm caused by the release of data describing a company's labor force that would reveal labor costs.¹⁰ Substantial competitive harm is likely to occur when the released information would provide a competitor with precise knowledge into how it might modify its business to undercut that of the submitter. However, substantial competitive harm is less likely to occur if the requested information is one of many factors needed for a competitor to gain an advantage.¹¹ Exemption 6 applies to "personnel and medical files and similar files the disclosure of which would constitute a clearly unwarranted invasion of personal privacy."¹² Content that is protected under exemptions 4 and 6 is redacted from the information that is released.

Construction trade unions or their representatives may request certified payroll information to monitor contractor, particularly nonunion contractor compliance with Davis-

⁹ See "DOJ Guide to the Freedom of Information Act." Ibid.

¹⁰ Ibid., p. 324.

¹¹ Ibid., p. 334.

¹² Ibid., P. 417.

Bacon requirements. These unions have an incentive to see that Davis-Bacon requirements are followed to ensure that nonunion contractors are not winning bids on federal contracts by violating local prevailing wage standards.¹³ In addition to incentives unions have greater expertise and resources to commit to compliance issues. For example, local union plumber and pipefitters are more likely to be familiar with other workers in an area and can determine if job classifications are properly assigned. Workers may be misclassified when a contractor utilizes a worker from a low-wage job classification (pipe layer) to perform the duties of another, high-wage classification (pipefitter). Noncompliance may also occur if local prevailing wage rates are not posted at the job site as required. Compliance issues arise if contractors mistakenly or intentionally do not accurately report hours worked or pay workers less than the prevailing wage rate for a particular job classification. The Davis-Bacon Act also establishes criteria regarding the use of apprentices. For example, apprentices and trainees employed on federal projects must be registered in approved programs. Prevailing wages for these workers are based on the level of program progress. These programs also establish the ratios in which apprentices may be utilized relative to journey workers and these ratios limit the number of trainees that can be employed on a project. Noncompliance may occur if workers are classified as apprentices, but are not registered in an approved program, or if apprentices are employed but not in the appropriate ratio. Evidence from independent investigations can be forwarded to the U.S. Department of Labor for formal investigation. Penalties for compliance violations include payment of back-wages, contract termination, and debarment from future contracts for up to three years.¹⁴

¹³ Union wages are either equal to or greater than prevailing wage rates so contractors that employ union workers are at a disadvantage if nonunion contractors base bids on wage rates that are lower than prevailing wages.

¹⁴ For an explanation of these and other compliance issues see “Fact Sheet #66: The Davis-Bacon and Related Acts (DBRA)”, Wage and Hour Division, U.S. Department of Labor. Accessed at: <http://www.dol.gov/whd/regs/compliance/whdfs66.pdf>.

The information contained in a certified payroll that is needed to monitor compliance depends on the specific issue that is being investigated. For example, to verify registration in approved apprenticeship programs or the proper use of apprentices requires employee names in addition to the job classifications of all employees, hours worked, and rates of pay. However, courts have decided that releasing the personal information in certified payrolls violates Exemption 6 of FOIA. For example, in *Painting Industry of Hawaii Market Recovery Fund v. the U.S. Department of the Air Force*, 26 F.3d 1470 and *Sheet Metal Workers International Association Local No. 9 v. the U.S. Air Force* 63 F.3d 994 (10th Circuit 1995) the courts ruled that disclosure of wage and hour information was allowed, but the private interests of individuals outweighs the public interest with respect to releasing information that identifies employees.¹⁵

Monitoring payment, hours worked, and job classifications does not necessarily require worker names and may only require this information, along with gross wages, deductions, and fringe benefits.¹⁶ Recent court decisions have ruled that releasing this information violates Exemption 4 of FOIA. For example, in *Torres Consulting and Law Group v. Department of Energy*, subcontractors submitted affidavits indicating that disclosing the wage and hour data reported in certified payrolls would be a competitive disadvantage.¹⁷ Multiplying hourly prevailing wage and benefit rates by the number of hours worked yields labor costs, or what these subcontractors refer to as “labor production rates.” The subcontractors assert that labor

¹⁵ There is a long history of FOIA requests by unions for certified payrolls dating at least to 1984. For example, see *International Brotherhood of Electrical Workers, Local 41 v. U.S. Department of Housing and Urban Development*, 593 F.Supp. 542, 545 (D.D.C.1984).

¹⁶ Evidence of compliance violations may be revealed by “backing into the wage rate.” That is, dividing gross pay by the hourly prevailing wage rate to solve for the number of reported hours worked that gives the impression of compliance. Extraordinary deductions may indicate that employees are required to “kick-back” some of their earnings to the employer. Employing laborers in excess of 1:1 ratios with journey workers may indicate that laborers are working outside of their job classification. For more examples see “Making Davis-Bacon Work,” U.S. Department of Housing and Urban Development. *Ibid.*, pp. 44-45.

¹⁷ See *United States District Court for the District of Arizona, Torres Consulting and Law Group, LLC, Plaintiff, v. Department of Energy, Defendant*. No. CV-13-00858-PHX-NVW. Document 24 Filed 11/27/13.

production rates are treated as confidential information in the construction industry and that disclosing them would allow to (*sic*) competitors to underbid the contractors when competing for work because labor production rates are a significant element of a contractor's price."¹⁸ These affidavits were considered sufficient evidence to support the decision of the likelihood of substantial competitive harm if the requested payroll information is released. The same reasoning and decision was reached in *Torres Consulting and Law Group v. National Aeronautics and Space Administration (NASA)*.¹⁹

C. Labor Costs as a Percent of Total Construction Costs

The claim that construction worker labor costs are a “significant element” of total construction costs is at variance with publicly available information that has been reported in peer-reviewed articles and in other research addressing the effect of prevailing wage laws on building costs. These studies, which are reviewed below, indicate that construction labor costs have decreased over time and currently range between 27% and 14% of total construction costs. These data suggest that other factors such as the costs of materials, fuels, equipment rentals, profit, etc. make up between 73% and 86% of construction costs. If labor costs are at best a minor element of overall costs, then even knowing this cost component perfectly will be of little use to competitors seeking to undercut bids. The studies examining labor costs as a percent of total construction costs provide consistent and clear evidence that labor costs are just one of the many variables that make up a bid and that releasing this information will not cause competitive harm.

¹⁸ *Ibid.*, pp. 7-8.

¹⁹ See *Torres Consulting and Law Group v. National Aeronautics and Space Administration*, CIV 14-00801 –PHX-MEA. Document 1 Filed 4-16-14.

Azari-Rad, Phillips and Prus report that, for the overall U.S. construction industry, construction worker labor costs were 30% of total construction costs in 1982 and 26% in 1992.²⁰ While the change over this period may be influenced by that stage of the business cycle, other data discussed below indicates that labor costs have continued to fall as a percent of construction costs over time. These authors define labor costs as including construction worker wages, benefits, and payroll taxes. Total construction costs include material and labor costs and exclude land purchases and architect fees. The data used in the study by Azari-Rad, Philips, and Prus was obtained from the Economic Census of Construction (ECC).

The U.S. Census Bureau conducts a survey of construction contractors in every state regarding industry employment, compensation, value of construction, expenditures on materials, and fuels, etc.²¹ The ECC reports data by geographic area, type of construction (residential, commercial, industrial, and highway, etc.), and for specialty trade contractors (plumbing, and electrical, etc.).²² Therefore, it is possible to calculate labor costs as a percent of total construction costs in a state, a particular sector of the construction industry, and to track changes

²⁰ Azari-Rad, Hamid, Peter Philips and Mark Prus. 2003 'State Prevailing Wage Laws and School Construction Costs.' *Industrial Relations*, Vol. 42, No. 3, pp. 445-457.

²¹ See "Construction: Geographic Area Series: Detailed Statistics for the State: 2012 Economic Census of the United States. Accessed at:

http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ECN_2012_US_23A1&prodType=table.

²² The classification of establishments covered in the 2012 Economic Census of Construction uses the industry definitions in the North American Industry Classification System (NAICS). In the NAICS system, an industry is generally defined as a group of establishments that use similar processes. The numeric coding system provides progressively narrower definitions of establishments with similar processes through successive additions of numerical digits. For example, the NAICS code of 23 identifies and covers all construction establishments and six-digit codes identify specific types of establishments involved in highway, street, and bridge construction or in particular specialty trades. See "North American Industry Classification System," U.S. Census Bureau. Accessed at: <http://www.census.gov/cgi-bin/sssd/naics/naicsrch?chart=2007>.

over time. The survey is conducted every five years.²³ Data from the 2012 survey are the most recent available.

Philips used ECC data for Kentucky to measure differences by sector and over time.²⁴ Data indicate that construction worker labor costs as a percent of total construction costs decreased steadily between 1977 and 2007 in the overall construction industry in this state. Labor costs were approximately 30% of total costs in 1977 and 21% in 2007. In Philips' study labor costs include construction worker wages, benefits, and payroll taxes. Construction costs are based on building costs, excluding land acquisition costs, construction design and oversight services not provided by construction contractors. Philips also observes that construction worker employment, as a percent of total contractor employment, has decreased from 87% in 1972 to 73% by 2007. Philips attributes the trends in labor costs and employment to technological change in the industry, increased construction worker productivity, and the greater use of white-collar labor as construction contractors have expanded the array of services they provide. These are national trends in the construction industry with effects that are not isolated to Kentucky. Philips also reports labor costs for different sectors of the Kentucky construction industry in 2007. For example, labor costs are 17% of total costs in for highway, street, and bridge construction and 20% for other civil engineering construction. For all projects funded by state, county, and municipal governments, labor costs are 20% of total construction cost.

Philips also points out several reasons why some contractors may assert that their labor costs are higher than the information obtained from the ECC. First, contractors may not

²³ For an explanation of the sampling methodology used in the Economic Census of Construction see: http://factfinder.census.gov/faces/affhelp/jsf/pages/metadata.xhtml?lang=en&type=survey&id=survey.en.ECN_EC_N_US#.

²⁴ Philips, Peter. 2014. "Kentucky's Prevailing Wage Law: An Economic Impact Analysis," University of Utah Working Paper.

distinguish between blue-collar construction worker labor costs and the labor costs of all employees (including white-collar workers). Second, if the contractor is a subcontractor, they may not be responsible for, or aware of the costs of materials, fuels, and other supplies used on the project. Third, the contractor may present data from an addition/renovation project that involved primarily construction labor (and did not involve significant material or white-collar labor costs). Finally, Philips points out that when contractors consider their labor costs they do not typically consider their profit as part of total construction costs. While profits are a return on the contractor's investment, this income is part of the cost paid by the project owner. For these four reasons, Philips concludes that data from the ECC are more reliable than the testimony of individual contractors regarding construction worker labor costs as a percent of total building costs. Additionally, the data reported by the ECC is based on information obtained from a large number of contractors, is publicly available, and is collected by an agency that is objective with respect to the issues involved in legal matters related to certified payroll requests.

Other researchers have used the ECC for different states and industries and have provided labor cost estimates that are comparable to those reported by Philips. For example, Duncan reports that labor costs were approximately 21% of total costs for highway, street, and bridge construction in Colorado in 2007.²⁵ In a series of reports examining the economic impact of state-level prevailing wage laws Duncan and Lantsberg and Duncan, Lantsberg, and Manzo find that labor costs and benefits are 23.0% of total costs in the overall construction industry in states with weak or no state-level prevailing wage law and 27.0% in states with average or strong wage

²⁵ Duncan, Kevin. "The Effect of Federal Davis-Bacon and Disadvantaged Business Enterprise Regulations on Highway Maintenance Costs." *Industrial and Labor Relations Review*, Vol. 68, No. 1, (January) 2015, pp. 212-237.

policies.²⁶ Labor costs represent 20.8% of the total costs of building highways, streets, and bridges in Wisconsin and 22.2% in Michigan. In the commercial and institutional building segment of the industry, labor costs represent 19.1% of total cost in Wisconsin and 13.8% in Michigan. These figures are based on the ECC for 2012.

The ECC does not report labor costs as a percent of total costs. This ratio must be calculated based on other data. In the studies by Duncan, Lantsberg, and Manzo labor cost as a percent of total construction cost is derived by dividing total construction worker payroll, plus proportionally allocated total fringe benefits, by the net value of construction work.²⁷ The net value of construction is based on the value of work completed by a contractor, less the value of work subcontracted to other contractors. The net value of construction is a broader measure of total costs than contractor bid prices since this measure of the value of construction includes the costs associated with change orders or follow-up maintenance. But, the measure of labor costs provided by the net value of construction is not biased by including subcontractor costs. The method used in the studies by Duncan, Lantsberg, and Manzo is used below to calculate labor

²⁶ “Building the Golden State,” by Kevin Duncan and Alex Lantsberg, March 2015a. Accessed at <http://www.smartcitiesprevail.org/wp-content/uploads/2015/04/SCP-Building-the-Golden-State.pdf>. “How Weakening Wisconsin’s Prevailing Wage Policy Would Affect Public Construction Costs and Economic Activity,” by Kevin Duncan and Alex Lantsberg, May 22, 2015b. Accessed at: <http://www.faircontracting.org/wp-content/uploads/2015/05/How-Weakening-Wisconsin%E2%80%99s-Prevailing-Wage-Policy-Would-Affect-Public-Construction-Costs-and-Economic-Activity2.pdf>. “The Cost of Repealing Michigan’s Prevailing Wage Policy: Impacts on Total Construction Costs and Economic Activity,” by Kevin Duncan, Alex Lantsberg, and Frank Manzo IV, June 17, 2015. Accessed at: <http://illinoisepi.org/countrysidenonprofit/wp-content/uploads/2014/06/The-Cost-of-Repealing-Michigans-PWL-FINAL.pdf>.

²⁷ The ECC defines construction worker payroll Includes the gross earnings paid in the reporting year to all construction workers on the payroll of construction establishments. It includes all forms of compensation such as salaries, wages, commissions, dismissal pay, bonuses, and vacation and sick leave pay, prior to deductions such as employees' Social security contributions, withholding taxes, group insurance, union dues, and savings bonds. Fringe benefits include legally required expenditures made by the employer for Social Security and Medicare contributions, unemployment compensation, worker's compensation, and state temporary disability payments as well as voluntary expenditures made by the employer for life insurance premiums, pension plans, insurance premiums on hospital and medical plans, welfare plans, and union negotiated benefits. The net value of construction includes the value of construction work less the cost of construction work subcontracted out to others. See “Construction: Geographic Area Series.” Ibid. Fringe benefits are reported for all workers. To allocate the portion provided to construction workers Duncan, Lantsberg, and Manzo use the ratio of construction worker earnings to total payroll.

costs as a percent of total construction costs for the specialty trade contractors involved in recent FOIA requests and court cases.

In July of 2012, Torres Consulting and Law Group filed a FOIA request with the Department of Energy regarding the Energy Systems Integration Facility construction project located in Golden, Colorado.²⁸ Specifically, the payroll request was made for project subcontractors that provided plumbing, heating, ventilation, and air conditioning (HVAC) services and electrical trade contractors.²⁹ Data from the 2012 ECC for Colorado indicates that labor costs for plumbing, heating, ventilation, and air conditioning contractors are approximately 26.9% of total construction costs. Comparable data for electrical trade contractors indicates that labor costs are approximately 25.3% of total construction costs. On August 19, 2013 Torres Consulting and Law Group submitted a FOIA request for certified payrolls with NASA pertaining to a revitalization water and waste water project in Florida.³⁰ This request was for specialty trade subcontractors performing plumbing, pipefitting, pipe laying, and pipe installation. Data from the 2012 ECC indicate that labor costs for these subcontractors in Florida are 24.7% of total construction costs.³¹ Rather than constituting a significant element of a contractor's bid, the data described above indicate that construction labor costs are one of several variables a competitor needs to gain an advantage. Consequently, it is unlikely that substantial competitive harm would occur with the release of certified payrolls.

II. Using Certified Payrolls to Calculate Labor Costs

²⁸ See "Torres Consulting and Law Group v. Department of Energy." *Ibid.*, p. 2.

²⁹ This is based on the NAICS classifications of 238220 for plumbing, heating and air conditioning contractors and 238210 for electrical contractors and other wiring installation contractors.

³⁰ See "Torres Consulting and Law Group v. National Aeronautics and Space Administration." *Ibid.*, p. 2.

³¹ This is based on the NAICS code for plumbing, heating, and air conditioning contractors is 238220.

In *Torres Consulting and Law Group v. Department of Energy (DOE)*, the DOE presented affidavits from contractors regarding the sensitivity of certified payroll information. These affidavits were considered sufficient evidence to rule that the payroll information, if released, could be used by competitors to undercut future bids. This decision was made in the absence of a detailed examination of certified payrolls. This study conducts such an analysis by examining certified payrolls from the beginning to the end of a project, payroll data for different projects for the same contractor, as well as payroll data when different job classifications are involved in a project.

Payroll information was collected from LCPtracker archives for the City of Denver. Public construction funded by the City and County of Denver is governed by a prevailing wage standard.³² This policy closely follows the Davis-Bacon Act with respect to project value threshold and apprenticeship programs, etc. Denver prevailing wage and benefit rates are based on Davis-Bacon wage determinations. Union wage and benefit rates prevail for all of the job classifications examined below.³³

LCPtracker is labor compliance software used for prevailing wage reporting.³⁴ Certified payroll reports, based on federal, state, and municipal prevailing wage standards, are created for public works construction. The certified payroll reporting for City of Denver projects contains all of the information included in form WH-347 that is used for federal projects covered by the Davis-Bacon Act, plus additional personal information (address, driver's license number, and complete social security number) as well as gross earnings for all projects the employee worked

³² See Ordinance Section 20-76, 20-76 Payment of Prevailing Wages. Accessed at: http://www.denvergov.org/Portals/741/documents/PW_General/20-76.pdf.

³³ See "Prevailing Wage Determinations," Office of the Auditor, City of Denver. Accessed at: <http://www.denvergov.org/auditor/DenverAuditor/PrevailingWage/tabid/443008/Default.aspx>.

³⁴ See LCP tracker Labor Compliance Software. Accessed at: <http://www.lcptracker.com/>.

on during the week. The City of Denver uses the LCPtracker software for city and federal prevailing wage reporting within its jurisdiction. Contractors use the software to submit weekly payroll reports and certification documents. The payroll data are reviewed by Office of the Auditor, City of Denver.³⁵ In the analysis that follows, information that identifies individual employees and contractors, specific projects, and specific project dates are omitted. The analysis is restricted to certified payrolls for nonunion contractors.

There are thousands of certified payrolls within the LCPtracker archives for Denver public works projects. Our analysis is not a comprehensive examination of all project types. Instead, the analysis is based on the specialty trade contractors that were the subject of recent payroll requests in Colorado and included in Part I on labor costs (electrical, plumbing, heating, ventilation, and air conditioning). This focus allows the information on percent labor costs to be integrated into the discussion of how releasing payroll data may be associated with competitive harm. We also limit the analysis to an examination of building construction (omitting heavy and highway projects). In the subsections that follow, we illustrate the implications regarding the use of payroll information by a competitor to undercut the future bids of a participating contractor. We also discuss the implications of the use of the job classification and hours worked data to reveal trade secrets. These illustrations progress from relatively simple examples to more complex cases.

A. Wage and Hour Data from Certified Payrolls

Table 1 contains summary wage and hour payroll data for the first of four projects completed by an electrical specialty contractor (identified here as Contractor #1). Data for the

³⁵ See “Prevailing Wage,” Office of the Auditor, City of Denver. Accessed at: <http://www.denvergov.org/auditor/DenverAuditor/PrevailingWage/tabid/443008/Default.aspx>.

other projects are reported in Table 1A that is presented below. Project 1 involved work on an existing electrical system in a historic building that was completed for the City of Denver in the fall of 2009.³⁶ Contractor #1 reported the payment of applicable prevailing wage rates for the corresponding job classification (building electrician). The prevailing wage rate was \$30.00 hourly wage, plus \$10.82 in benefits in late 2009.³⁷ The project required a total of 60 labor hours to complete extending over seven weeks. Calculating labor costs for Project 1 from the information reported in the certified payroll is straight forward. The same hourly compensation rate applied to all workers involved in the project and only one job classification was employed. Consequently, labor cost equals \$2,449.20 (\$40.82 x 60 hours).

Table 1: Summary of Complete Certified Payroll Data, Electrical Specialty Contractor #1, Projects for City of Denver, 2009.

Project	Total Project Hours	Prevailing Wage & Fringe	Hours at Prevailing Wage	Hours and Wages Above Prevailing Wage	Hours and Wages/ Apprentices
Project 1 (repair work)	60.0	\$30.00 (\$10.82)	60.0	0	0

Source: LCPtracker, City of Denver.

This simple example illustrates how labor costs can be obtained from certified payrolls, but it is important to keep in mind that the hours reported are based on the time needed to complete the project. If these hours deviate from the preliminary estimate of labor time used in the preparation of the bid, certified payrolls are of little use in bid undercutting and the release of this information does not cause competitive harm as described in FOIA Exemption 4. There are several factors, that are reviewed below, that can cause the hours used in bid preparation to

³⁶ The LCPtracker records for Denver do not contain detailed job descriptions. These are available from the city, but require a Colorado Open Records Act request to obtain them. The descriptions included in the LCPtracker records are sufficient to provide information on general differences between the projects.

³⁷ See "Prevailing Wage Determinations." Ibid.

diverge from those reported in a payroll. Before illustrating the effects of these factors, it is useful to review the process of bid preparation, particularly with respect to the estimation of labor hours.

B. Labor Estimating Manuals and Bid Preparation

Contractors typically use labor estimating manuals to obtain initial labor cost estimates. These manuals are widely used in the construction industry and provide estimates of the labor hours for the specific items needed to complete a project. The time estimates are typically based on historical data collected from contractors.³⁸ The manuals are also highly specialized. For example, members of the Mechanical Contractors Association of America have access to WebLEM, a web-based labor estimating manual that provides detailed labor units for typical HVAC, plumbing, and pipefitting tasks.³⁹

Because of the nature and requirements of federal contracting and the use of estimating software, labor hour estimates that are used in calculating bids are initially similar on Davis-Bacon projects.⁴⁰ For example, the project design specifications on federal projects identify the quality and quantity of materials required of the project. Since materials brought to the job site are inspected on federal projects, all contractors should have very similar materials cost estimates.⁴¹ Labor estimating manuals provide projections of the time needed to complete a

³⁸ Information obtained from Weblem.org personnel.

³⁹ See MCAA “Labor Estimating Manual” for the mechanical trades. Accessed at: <https://www.weblem.org/>. Other examples include estimating software by RS Means that, in addition to labor hour estimates, calculates crew sizing and allows for verification of subcontractor quotes. Accessed at: <http://www.rsmeansonline.com/>. The National Electrical Contractors Association (NECA) offers the NECA Manual of Labor Units to members. Accessed at: <http://www.necanet.org/neca-store/publications>.

⁴⁰ This section benefitted from discussion with two bid estimators with experience bidding on federal construction projects.

⁴¹ See “Construction Program Management and Inspection Guide, Appendix D - Guide for Making Inspections-in-Depth on Federal-Aid Highway Construction Projects,” Federal Highway Administration, U.S. Department of Transportation. Accessed at: <http://www.fhwa.dot.gov/construction/cpmi04d1.cfm>.

project based on the types of materials used.⁴² For example, if a plumbing job requires the installation of pipe, valves, and couplings, the labor estimating manual will provide an estimate of labor hours depending on the amount of these items that will be used on the project.

Manuals differ with respect to items and tasks included. For example, some manuals for plumbing work may not include estimates for purging lines or for the installation of hangers. In these cases contractors must provide their own estimates. Contractors also make adjustments for the height at which work will be performed, for other project features that increase construction time, overhead costs, and profit margins, etc. Differences in how contractors make these kinds of adjustments may cause labor hour estimates to diverge from the initial similarity based uniform materials requirements. Regardless of the process and outcome of bid preparation, several other factors cause the hours reported in certified payrolls to deviate from initial estimates. One source of the difference between the labor hours estimate used in the preparation of the bid and the hours needed to complete the project is change orders.

C. Change Orders and Certified Payrolls

Change orders involve adding or deleting work that was originally specified in the contract. These are very common in all aspects of construction, so common that the Federal Highway Administration asserts that it is unrealistic to expect that a project can be built without changes to the original plan.⁴³ For example, in a random sample of projects from the 2000 construction season, the Federal Highway Administration found 159 change orders in 28 highway projects.⁴⁴ While these projects are covered by the Davis-Bacon Act, other evidence

⁴² See “WebLEM Demo”. Accessed at: <http://www.weblem.org/flash/default.html>.

⁴³ See “Change Orders, Federal-Aid Essentials for Local Public Agencies.” Federal Highway Administration, U.S. Department of Transportation. Accessed at: <http://www.fhwa.dot.gov/federal-aidessentials/catmod.cfm?id=4>

⁴⁴ “Process Review On: Change Orders.” (State) Department of Transportation and Federal Highway Administration

suggests that projects that are not covered by prevailing wage laws are characterized by more change orders. Philips, Mangum, Waitzman, and Yeagle's examination of highway construction projects in Utah indicates that, on average, change orders added two percent to the winning bids of projects covered by the state's prevailing wage policy.⁴⁵ On the other hand, change orders were more than three times higher on highway projects that occurred after the repeal of Utah's prevailing wage standard in 1981.

Regardless of prevailing wage status, change orders are prevalent in private, state, and municipal construction. For example, the typical commercial project involves 56 change orders.⁴⁶ In an examination of 16 campus projects completed between 2001 and 2004, Michigan State University found 1,675 change items in a total of 159 change orders. These alterations increased project costs by an average of 8.1%.⁴⁷ Additionally, all 17 of the county government capital projects managed by the Maryland Department of General Services had change orders initiated by the contractor or by the owner. These projects were built between 2009 and 2013. Changes resulted in increased contract costs on 15 projects and decreased costs on two others. The cost changes ranged from -1.1% and 24.5%. The average for all projects was 8%.⁴⁸ In an

(State) Division, Federal Highway Administration, U.S. Department of Transportation. Accessed at: <http://www.fhwa.dot.gov/construction/reviews/revco3.pdf>.

⁴⁵ Philips, Peter, Mangum, Garth, Waitzman, Norm and Yeagle, Ann. 1995. "Losing Ground: Lessons from the Repeal of Nine "Little Davis-Bacon" Acts." Working Paper, Economics Department, University of Utah.

⁴⁶ See "The Trouble with Change Orders." Construction Law, Lang and Klain, PC. Accessed at: <http://www.lang-baker.com/publications/constructionadvisor/changeorders.htm>.

⁴⁷ The projects at MSU were covered by Michigan's prevailing wage law. Additional costs at MSU compared to 3% for Purdue and Notre Dame, 7% for universities in Wisconsin and 5-10% for college construction in Minnesota. See "Summary Report: Development of a Change Order Management Process for Use on Construction Projects at Michigan State University," November 12, 2004. Accessed at https://www.msu.edu/~tariq/Change_Order_Study_MSU.pdf.

⁴⁸ See "Change Orders in County Government Construction Projects." Report Number 2014-6, March 18, 2014. Accessed at: http://www.montgomerycountymd.gov/OLO/Resources/Files/2014_reports/FinalChangeOrderReport.pdf

examination of new school construction in Massachusetts, Belman, et al. report that change orders and other costs increased winning bids by an average of 6.2%.⁴⁹

The alterations in labor hours associated with change orders will be reflected in certified payrolls. For example, if change orders add hours of work to a project, the labor costs reported in a certified payroll will increase. The final cost of the project will also increase and rise above the level of the initial bid. While information on the bids of all participating contractors is often available after the completion of a project, the costs associated with change orders are rarely reported and are very difficult to obtain.⁵⁰ When change orders add to the final cost of a project, the labor hours and costs that are reported in a certified payroll deviate from the estimate of labor time and labor costs used in preparing the winning bid. A competitor with a complete payroll record may be able to calculate the labor costs required to finish the project, but the competitor will not be able to determine how much change orders caused final labor hours to exceed the initial estimate of hours used in the preparation of the bid. Under these conditions, if a competitor used the certified payroll information to attempt to undercut on a future bid for an identical project, the competitor's bid would be too high. The opposite is the case for change orders that are associated with fewer hours of work. In this case the reduction in hours needed to finish the job would be lower than the estimate of labor hours included in the bid. Due to the prevalence of change orders and the uncertainty regarding the number of changes and their cost, certified payrolls are very unreliable for the purpose of undercutting bids.

D. Off-Site Work and Certified Payrolls

⁴⁹ Belman, Dale, Russell Ormiston, William Schriver, Richard Kelso and Kenneth A. Frank. 2010. "The Effects of Project Labor Agreements on School Construction Costs in Massachusetts." *Industrial Relations*, Vol. 9, No. 1, pp. 44-60.

⁵⁰ See Duncan, *Ibid.*

The labor cost information reported in a certified payroll will also vary depending on how off-site work for a project is conducted.⁵¹ For example, the wages of workers employed by a contractor at an off-site fabrication facility are not covered by Davis-Bacon prevailing wages if the location and operation of the fabrication plant are not dedicated exclusively to the federal project. In these cases, the wages and benefits of these off-site workers would not be included in the certified payrolls required under Davis-Bacon. However, the wages of these off-site workers are part of the contractor's expenses since they are producing components to be used on the federal project. Only the wages and benefits for those working on-site or at a fabrication facility exclusively dedicated to the project are covered by Davis-Bacon and reported in the certified payrolls. If a contractor utilizes an off-site facility that is exclusively dedicated to the federal project, the certified payrolls will reflect these labor costs. However, if an off-site facility that is not exclusively dedicated to the project is used, the certified payrolls will not reflect all of the labor costs of the project. Whether an off-site facility is used is not reported or publicly available. Uncertainty regarding the use of off-site facilities limits the reliability of the information reported in a certified payroll in estimating another contractor's labor costs and future bids.

⁵¹ See requirements for off-site work in DBA/DBRA Compliance Principles, US Department of Labor, Prevailing Wage Resource Book. Accessed at: <http://www.dol.gov/whd/recovery/pwrb/Tab9.pdf>.

E. Differences in Construction Worker Skills and Productivity

The certified payroll data for the City of Denver projects completed by Contractor #1 can be used to illustrate additional limitations in using this information for bid undercutting. Data for all four projects are reported in Table 1A. In addition to Project 1, this contractor completed two other relatively small projects with 60 to 63.5 hours reported. Projects 1 and 2 are both electrical repair projects. As described above, Project 1 involved work on an existing electrical system in a historic building. Project 2 required repairs to mechanical equipment. Project 3 involved the installation of mechanical equipment. Project 4 was a large demolition project with approximately 590 labor hours reported.

Table 1A: Summary of Complete Certified Payroll Data, Electrical Specialty Contractor #1, Projects for City of Denver, 2008-2009.

Project	Total Project Hours	Prevailing Wage & Fringe	Hours at Prevailing Wage	Hours and Wages Above Prevailing Wage	Hours and Wages/ Apprentices
Project 1 (repair work)	60.0	\$30.00 (\$10.82)	60.0	–	–
Project 2 (repair work)	63.5	\$30.00 (\$10.82)	54.5	4 hours at \$40.82 (\$10.82) 5 hours at \$33.32 (\$10.82)	–
Project 3 (non-repair project)	63.0	\$30.00 (\$10.82)	57.0	–	6 hours at \$11.63 (\$2.63)
Project 4 (demolition project)	588.5	\$28.91 (\$10.33)	385.5	–	203 hours at rates ranging between \$12.00 and \$14.65 (\$2.53 and \$4.64)

Source: LCPtracker, City of Denver.

The argument that knowing the labor costs on one project can be used to undercut the bids on future projects assumes that the past and future projects are similar. While projects 1 and 2 are both repair jobs with similar labor hours, there are qualitative differences between these

jobs. Project 1 required repair work on an existing electrical system in a historic building. Work on these types of structures may require modern code compliance and system upgrades.⁵² The types of tasks electricians would perform on this project likely differ from the diagnostic work required of repairs to the mechanical equipment involved in Project 2. These two projects reveal an important characteristic of construction. Building is distinct from manufacturing where the product and the production process are characterized by uniformity. On the other hand, construction work typically varies from job to job. Because of the qualitative differences between projects 1 and 2, the similarity in quantity of hours worked is of little use to a competitor who wishes to use labor cost information from Project 1 to undercut the bid on Project 2.

In addition to qualitative differences, projects can also differ in terms of size and the quantity of hours needed to complete the work. While projects 1-3 are similar with respect to reported labor time, work hours range significantly between all projects completed by this contractor. Project 4 with about 590 hours is an example. Payroll information from small jobs is of little use in estimating the labors of larger projects. Taking qualitative and quantitative difference into consideration, it is clear that the labor cost data from Project #1 requiring 60 hours of electrical repair on a historic building would be of little use in estimating the labor costs of a much larger demolition project like Project 4 that ultimately required approximately 590 reported hours.

While Project 2 reported a similar number of hours to complete as Project 1, the electricians used in Project 2 were not all paid the same wage rate (according to data reported in

⁵² See Swanke Hayden Connell Architects. 2000. "Historic Preservation: Project Planning and Estimating." John Wiley & Sons. ISBN: 978-0-87629-573-1.

the certified payrolls for Project 2). For example, of the total 63.5 total hours reported, 54.5 hours were completed by employees who were paid the prevailing wage rate (\$40.82 total hourly compensation). Two other employees were paid \$40.82, plus \$10.82 in benefits (total hourly compensation of \$51.64) and \$33.32, plus a fringe of \$10.82 per hour (for a total hourly equal to \$44.14). These two employees worked four and five hours on this project, respectively. Labor costs for this project can be calculated by taking these differences into account. Here, labor costs equal \$2,651.95 ($[54.5 \text{ hours} \times \$40.82] + [4 \text{ hours} \times \$51.64] + [5 \text{ hours} \times \$44.14]$). The labor costs for projects 1 and 2 are roughly similar (\$2,449.20 versus \$2,651.95) with the difference due to slightly more reported time and to the workers receiving higher pay in Project 2. The problem with comparing labor costs between these two projects is that the quantitative measure of cost does not capture qualitative difference in the workers completing these projects.

Construction worker compensation depends, in part, on skills and experience. The two employees who received compensation in excess of the prevailing wage rate minimum for Project 2 are likely more skilled and experienced than those employees receiving the prevailing wage rate. Contractor #1 may have needed these skilled workers to address the diagnostic requirements of Project 2 that involved repairs to mechanical equipment. Regardless, the differences in rates of pay and the implied differences in worker skills and productivity compound the use of labor costs by a competitor seeking to undercut bids on future projects. While a competitor possessing the payroll data for Project 2 would know that different rates of pay were used, the wage data does not reveal specifics regarding the worker productivity needed to complete the project in the 63.5 hours reported.⁵³ This example illustrates an obvious point:

⁵³ In addition to variable productivity among workers receiving prevailing wages is the variable productivity of supervisors of these workers. Project managers, superintendents, and foremen may also vary from project to project

employees of an establishment, even those performing the same work, will vary in terms of productivity. These differences make it very difficult to accurately compare labor costs for different projects. This issue persists even if employees on two comparable projects are all paid that same prevailing wage rate (as is the case in Project 1). The wage policy sets a floor for compensation, but not for worker productivity.

Bilginsoy's comparison of joint union and management apprenticeship programs and nonunion multi-employer programs provides insight into the extent of skill differences in the construction industry, particularly in the nonunion side of the building trades.⁵⁴ Bilginsoy's findings indicate that graduation rates are lower in nonunion apprenticeship programs.

Additionally, those who leave programs prior to graduation do so before a substantial buildup of skills. This suggests that the range of skill differences is far greater in the nonunion sector of the construction industry. The prevailing wages set a floor for hourly rates of pay, but there is no guarantee that all workers earning this minimum wage are equally skilled and productive.

Workers completed Project 1 in a reported 60 hours, but their level of productivity is unknown.

It is also unknown how long it would take workers with different (higher or lower) productivity to complete this project.

Data from Project 3 illustrates the issue of varying labor productivity when apprentices are employed on a project. Total reported labor hours for this project are equal to 63.

Approximately 9.5% (six hours) were completed by a supervised apprentice. The labor costs needed to complete this project can be calculated by summing the product of the hours worked and wage rates for the two types of workers. But, productivity on this job may be lower (and

and in the relative efficiency of managing construction workers. This variability will contribute to costs differences between projects, but is not revealed in certified payrolls.

⁵⁴ Bilginsoy, Cihan. 2007. "Delivering Skills: Apprenticeship Program Sponsorship and Transition from Training." *Industrial Relations*, vol. 46, No. 4, pp. 738-765.

hours higher) due to the use of a trainee and due to the reduction in output associated with time spent by a journey worker supervising the apprentice. The quantitative measure of labor costs does not capture qualitative differences in the workers completing this project.

Project 4 was a larger project requiring approximately 590 labor hours. This demolition job was completed prior to the other jobs in 2008. Contractors complete a variety of projects that differ in technical requirements and size. Additionally, this project involved a large number of apprenticeship hours. Apprenticeship hours represent approximately 35% of total labor hours for this project. This example indicates that worker skills and experience can vary widely from project to project, compounding the problem of using labor costs in undercutting bids.

The illustrations presented here are simplified as we have selected projects for ease of presentation that employ a single job classification (electricians). The challenge of using labor costs to undercut future bids is further complicated when projects involve job classifications for multiple trades. In a section H below, we present data from a plumbing/HVAC specialty contractor that utilized pipefitters and sheet metal workers on projects for the City of Denver (see Table 5). The use of these two job classifications varies with the technical and material requirements of the job. As the ratio of sheet metal workers to pipefitters changes, so do labor costs as these workers receive different prevailing wage rates. Hence, it is not possible to use the labor cost from a multi-trade project to estimate the labor costs on a future project, unless the utilization of each job classification is the same. This would occur if the requirements of two jobs are the same, which is an exceedingly rare occurrence as illustrated below.

F. Project Backlogs, New Bidders, and Other Factors Affecting Bids

The data for projects 1, 2, and 3 reported in Table 1A suggest that this contractor was engaged in numerous projects for the City of Denver in the summer of 2009. We are not able to determine how many other projects this contractor was working on, but these data are consistent with a backlog of projects and a high utilization of contractor capacity. Jofre-Bonet and Pesendorfer report that bids on highway construction projects in California are higher when a contractor's productive capacity is obligated to previously awarded projects.⁵⁵ Specifically, these authors find that when project backlog increases by 57 percent, bids increase by 12 percent (and vice-versa). In an examination of highway construction in Oklahoma, De Silva, Dunne, and Kosmopoulo find that a 1% increase in contractor backlog is associated with a 0.3% increase in the bid.⁵⁶ Changes in contractor backlogs are only some of the differences between contractors, projects, and economic conditions that affect bids.

First-time bidders or new entrant contractors often lack production experience in the new area or possess incomplete information about bid cost components. De Silva, Dunne, and Kosmopoulo also find that entrants bid more aggressively (38.5% lower) than incumbent firms. This suggests that bid behavior changes as bidders acquire experience. The bids of one contractor, even for similar projects may change with the accumulation of information over time. How this change affects bids is unknown to a competitor seeking to undercut future bids. Porter and Zona's examination of highway construction projects in New York reveals a pattern of

⁵⁵ Jofre-Bonet, Mireia and Pesendorfer, Martin. 2003. "Estimation of a Dynamic Auction Game." *Econometrica*, Vol. 71, No. 5, pp. 1443-1489.

⁵⁶ De Silva, D., Dunne, T. and Kosmopoulou, G. 2003. "An Examination of Entrant and Incumbent Bidding in Road Construction Auctions." *The Journal of Industrial Economics*, Vol. 21, No. 3, pp 295-316.

phony higher bids and one serious bid among contractors participating in a collusive cartel.⁵⁷

This demonstrates that contractor bids may vary from project to project if firms are involved in bid rigging. Balat examines the effect of the American Recovery and Reinvestment Act on bids for road construction in California and finds that the stimulus increased construction costs by 2.8%.⁵⁸ This suggests that as economic conditions change, so do bids and costs. The combined effect of all of these factors illustrates how bids are moving targets from project to project.

G. Incomplete and Inconsistent Labor Cost Data Reported in Certified Payrolls

The wage and hour data reported in a certified payroll may be insufficient to accurately calculate project labor costs if the owner of the company worked on the project. The Davis-Bacon Act allows for flexibility in payroll reporting in this case. If the subcontract price covers the applicable prevailing wage rate for the number of hours worked by the company owner on a Davis-Bacon project, the U.S. Department of Labor considers this self-performing subcontractor to have been paid in compliance.⁵⁹ Consequently, wage rates for self-performing subcontractors may not be included in the certified payroll.

The impact of flexibility in reporting payroll data for company owners is illustrated by the payroll data reported in Table 2. These data are for one week in the spring of 2013. The plumbing specialty contractor reported total hourly compensation \$0.00 below the corresponding prevailing wage rate for two employees working as plumbers (excluding HVAC pipe). The

⁵⁷ Porter, Robert and Zona, J. Douglas. 1993. "Detection of Bid Rigging in Procurement Auctions," *Journal of Political Economy*, Vol. 101, No. 3, pp. 518-538.

⁵⁸ Balat, Jorge. 2012. *Highway Procurement and the Stimulus Package: Identification and Estimation of Dynamic Auctions with Unobserved Heterogeneity*. Working Paper.

⁵⁹ See "Labor Relations Letter LR-96-01, Labor Standards Requirements for Self-Employed Laborers and Mechanics," Labor Standards and Enforcement Letters, U.S. Department of Housing and Urban Development. Accessed at: http://portal.hud.gov/hudportal/HUD?src=/program_offices/labor_standards_enforcement/olr_9601.

prevailing wage determination for this job classification was \$44.63 (\$33.19 in wages and \$11.44 in fringe benefits in 2013). Regardless, if data are missing for the owner, it is difficult to calculate labor costs accurately. For example, the City of Denver requires the reporting of hours worked by the company owner, but not wage rates. This is partly due to owners taking monthly salaries instead of the required weekly payments under Davis-Bacon. While there were three workers involved on this project, wage and hour information is completely reported for only two employees. Based on these workers, labor costs are 15 hours x \$44.62 total hourly compensation = \$669.3 for this week.

Table 2: Weekly Certified Payroll for a Self-Performing Plumbing Specialty Contractor, City of Denver Project, 2013

Worker	Classification	Hours Worked	Reported Hourly Rate of Pay
Company Owner	Owner	7.5	\$0.00
Employee 1	Plumber (excluding HVAC pipe)	7.5	\$44.62
Employee 2	Plumber (excluding HVAC pipe)	7.5	\$44.62

Source: LCPtracker, City of Denver

If a competitor were to have this information, they would quickly realize that accurate labor costs for all work on this project could not be calculated. Owners of small contracting businesses tend to work on projects. This practice would affect the ability of a competitor to calculate labor costs when small subcontracting firms win awards on prevailing wage projects.

Fringe benefit contributions may vary from week to week, making it difficult for a competitor, possessing payroll data, to accurately estimate complete project labor costs. For example, an employer may contribute to an employee's 401(k) retirement plan. These contributions may be based on the overall employment agreement and may be in excess of

Davis-Bacon minimums. The data reported in Table 3 illustrate this issue. This plumbing specialty contractor made 401(k) contributions to employees while working on a City of Denver prevailing wage project in 2013. The effect that these contributions can have on the calculations of labor costs is illustrated by data for two selected weeks. For example, Employee 1 earned \$546.91 in gross weekly pay during Week#1 (13 hours x \$42.07 wage). The prevailing wage rate for the pipefitter (including HVAC pipe) during the spring of 2013 was \$30.10 hourly, plus \$11.52 in fringe benefits (for total hourly compensation of \$41.62). These workers received an hourly rate greater than the prevailing wage floor.

Table 3: Certified Payrolls with Changing Retirement Contributions. Plumbing/HVAC Specialty Contractor, City of Denver Project, 2013

Week #1	Classification	Hours Worked	Hourly Wage	Gross Wages	Combined Benefits	Hourly Benefits
Employee 1	Pipefitter (including HVAC pipe)	13.0	\$42.07	\$546.91	\$252.64	\$19.43
Employee 2	Pipefitter (including HVAC pipe)	5.5	\$42.00	\$230.97*	\$244.22	\$44.40
Week #2						
Employee 1	Pipefitter (including HVAC pipe)	26.0	\$42.07	\$1,093.75*	\$352.86	\$13.57
Employee 2	Pipefitter (including HVAC pipe)	4.5	\$42.00	\$188.98*	\$154.98	\$34.44

Source: LCPtracker, City of Denver. *Error in certified payroll calculations.

Total fringe benefits were \$252.64 (or \$19.43 hourly). Some of these benefits consisted of a 401(k) contribution. Employee 2 received total benefits of \$244.22 that exceeded gross wages of \$230.97 for Week #1. Benefits were high because of the 401(k) contribution provided by the employer that week. Retirement contributions were made to both workers during Week

#2, but not by the same amounts. On an hourly basis, benefits were \$13.57 in Week #2 for Employee 1, down from \$19.43 in Week #1. The same is the case for Employee 2 who saw his/her hourly benefits compensation fall from \$44.40 in Week #1 to \$34.44 in Week #2. Retirement contributions appear under “Other” on Form WH 347. Consequently, it is possible to separate this contribution from others. With a complete payroll record, a competitor could calculate total labor costs (wages and benefits). However, when benefits exceed Davis-Bacon minimums and these contributions are made inconsistently, a competitor would not know if the contributions are based on the work completed for the project, or were made based on the overall employment agreement and simply paid over this time period.

H. Trade Secrets and Crew Mix

Data in Table 4 report percentage hours worked for plumbers and sheet metal workers involved in four projects for a private company conducting business at a facility owned by the City of Denver in 2013. Because the company was housed in a facility owned by the city, the work was covered by Denver’s prevailing wage policy. All four projects were completed at the same location in different areas of the facility. Projects 1 and 2 were in the same area of the facility. Project 2 started immediately after the completion of Project 1 suggesting that the former was an extension of the latter. Data for these two projects indicate that, in terms of hours of work, the ratios of plumbers to sheet metal workers are similar. Approximately 55% of total hours were completed by plumbers with about 45% of hours completed by sheet metal workers on Project 1. Approximately 57% of total hours were completed by plumbers with about 43% of hours completed by sheet metal workers on Project 2. This suggests that for these projects, the contractor used the two job classifications in about the same ratio. This may indicate a specific ‘recipe,’ or trade secret used by this contractor that allows the company to complete projects

efficiently and at a low cost. On the other hand, if the project designs and material requirements for projects 1 and 2 are similar, one would expect the relative hours for the two crafts to also be similar. Consequently, the ratios between the two jobs are similar because these projects are qualitatively similar.

Table 4: Percent of Project Labor Hours by Trade. Projects by Mechanical Contractor #2, 2013.

Project	Percent Hours Plumber (excluding HVAC)	Sheet Metal Worker	Total
1	54.5%	45.5%	100%
2	56.9%	43.1%	100%
3	16.6%	83.4%	100%
4	76.9%	23.1%	100%
5	96.4% = 86.0 (journey workers) + 10.4% (apprentices)	3.6%	100%

Source: LCPtracker, City of Denver.

The ratio changes significantly for other projects in different areas of the facility. Plumbers account for about 17% of total hours for Project 3 and approximately 77% for Project 4. While these projects were completed by the same contractor, in the same facility, the data indicate that the ratios are the same when the projects are the same. But, this is a very rare occurrence. It is more likely that ratios vary between projects, even if they are at the same location and involve the same general type of work because of qualitative differences between projects.

Project 5 was a much larger project, involved a different type of work at another location, and included plumber apprentices. This project extended over 60 payroll periods and overlapped the projects 1-4. These data provide additional evidence that labor utilization ratios differ by project. The mix of job classifications also varies within a classification due to the use of

apprentices.⁶⁰ This information demonstrates that the hour and job classification data do not reveal trade secrets regarding unique combinations employed by a contractor.

Another possible concern is that a contractor applies labor in a particular order over the course of a project in a unique manner that is efficient. If so, this method may represent a trade secret. Weekly hours worked on projects 1-4 are presented in Table 5 and are used to explore the implications regarding the ordering of workers. Many of the same employees of this contractor worked on both projects. Projects 1 and 2 are similar in terms of the ratio of hours worked by plumbers and sheet metal workers. But, the order in which these workers are applied varies. For example, during the first and second week of Project 1, plumber and sheet metal worker hours are equal (8 hours for each job classification in the first week and 28 hours each during week two). This implies that the contractor uses these types of workers in a fixed ratio of one-to-one, at least at the inception of a project. The ratio of plumber to sheet metal worker hours rises to 2.5 (40/16) in week three before returning to one-to-one in Week 4. A possible explanation of this pattern is that the contractor uniquely developed this order because it is efficient and, consequently it is a trade secret. However, the data for Project 2 suggests that this explanation is unlikely. Projects 1 and 2 are similar, but there is no evidence of the consistent application of workers between these projects. Rather than starting out at a one-to-one ratio, plumbers and sheet metal workers in Project 2 are used in approximately 2.5-to-1 ratios during the first two weeks. Only in week 6 of Project 2 are these workers used in a one-to-one ratio. This ratio occurred in 5 of the 12 weeks of Project 1. There are several weeks in Project 1 where 2 plumbers worked with 1 sheet metal worker (see number of workers in parentheses for weeks 7, 8, and 12). However, in Project 2 there is only one week (the second) where two plumbers

⁶⁰ The use of apprentices depends, in part, on the availability of these workers and availability changes over time. This variability compounds efforts to use the crew mix from one job to estimate the mix for another project.

worked with one sheet metal worker and two weeks where three plumbers worked together. The data for projects 2 and 3 suggest that the order of labor is not uniquely applied in a manner consistent with a trade secret. Even on similar projects, the order of labor varies from week to week and likely responds to other factors such as the demands of the project schedule, working around the schedule of other contractors engaged on this project, and work by this contractor on other projects, etc. The skill and experience levels of workers vary from firm to firm. It is unlikely that even if a competing contractor came into possession of the order of labor data contained in a certified payroll that they could implement, or find use in this information.

Table 5: Order of Applying Workers from Different Trades. Projects by Mechanical Contractor #2, 2013.

	Project 1		Project 2		Project 3		Project 4	
Week	Plumb	SM	Plumb	SM	Plumb	SM	Plumb	SM
1	8	8	40 (2)	16 (1)	–	–	40 (2)	24 (1)
2	28	28	104 (3)	40 (1)	–	–	–	–
3	40	16	56 (3)	40 (1)	32	32	–	–
4	32	32	36	40	0	28	–	–
5	40	28	4	40	24	40	40	0
6	24	40	32	32	3.5	29		
7	43.5 (2)	29 (1)	24	40	3	40		
8	43 (2)	40 (1)	32	33.5	0	32		
9	28	32	16	0	0	40		
10	40	40	–	–	0	32		
11	40	40	–	–	0	40		
12	80 (2)	40 (1)	–	–				
13			24	0				
14			–	–				
15			–	–				
16			4	0				
Total Hours	412.5	373.0	372.0	281.5	62.5	313.0	80	24
Trade Percent	54.5%	45.5%	56.9%	43.1%	16.6%	83.4%	76.9%	23.1%

Source: LCPtracker, City of Denver. The number of workers utilized in a week is reported in parentheses, if the number exceeds one. Dashed line (–) means no work reported that week.

Even though all of the projects reported in Table 5 involve plumbing and sheet metal work at the same facility, the order and application of labor varies between the individual projects. For example, there are several weeks in Project 3 that do not involve plumbers. On the other hand, there is a week for very small Project 4 that did not involve sheet metal worker. Other data reported in Table 5 include the hours by trade for each project (Total Hours) and the percentage of total hours by trade that are also reported in Table 4. These data indicate that the ratios in which different trade workers are used varies with qualitative differences between projects. In sum, these data illustrate that, while there are trade secrets in the construction industry, they are not revealed by the information contained in certified payrolls.

The variation in the use of trades between projects affects labor costs and complicates the use of certified payrolls in undercutting bids. Prevailing wage rates vary between trades. As the utilization of different trades varies between projects, so do labor costs as more (less) plumbers and sheet metal workers are employed. For example, Project 3 will have a different labor cost total than Project 2 because Project 3 has fewer hours and because it utilizes fewer relatively higher paid plumbers. Total prevailing compensation (wages and benefits) was \$44.62/hour for plumbers (excluding HVAC) that worked on projects 2 and 3 in 2013. Total prevailing compensation for sheet metal workers was \$42.64/hour. As different trades are employed on projects in different combinations, labor costs will vary from project to project. The relatively simple examples used here illustrate this effect. The variation in labor costs increases as more trades (laborers, apprentices, etc.) are utilized on qualitatively different projects. This increases the difficulties in using certified payroll data from one project to estimate the labor costs and bid of a future project.

III. Publicly Available Bid Results from State Departments of Transportation and Certified Payroll Records for Construction Funded by the State of California

The Federal Highway Administration (FHWA) requires state departments of transportation to provide the FHWA with bid results on federally funded projects including detailed bid prices for each of the items included in the project.⁶¹ Departments of transportation are also required to provide bid item details for at least the three lowest acceptable bids and total amounts of all acceptable bids. All state departments of transportation make some of this information available to the public.⁶² The information released by departments of transportation as reported in Table 6 is far more detailed and potentially useful in compiling competitive bids than information contained in certified payrolls, yet the evidence points to no detectable competitive harm to participating contractors.

The released bid information reported in Table 6 varies from state to state. All states provide the name and bid of the contractor that was awarded the project. Most states also report the bids of each participating contractor. Twenty-five departments also provide contractor bid prices on each of the detailed items listed in the bid. These bid items identify each of the specific tasks included in the project. The total bid is the sum of the item prices.⁶³ Eighteen states also release the department's engineer's estimate. This is the department's estimate of the cost of the project. The timing of the release of this information to the public varies by state. Some departments of transportation release the information 30 minutes to a few days after the opening of bids. Most departments release the information shortly (a month or two) after the project is

⁶¹ See regulation 23 CFR 635.113, accessed at: <http://www.gpo.gov/fdsys/pkg/CFR-2011-title23-vol1/pdf/CFR-2011-title23-vol1-sec635-113.pdf>.

⁶² Information collected from the department of transportation for each state.

⁶³ For an example, see Bid Results for Recently Let Projects, Colorado Department of Transportation. Accessed at: <http://www.coloradodot.info/business/bidding/Bid%20Results>.

formally awarded to the winning contractor. Regardless of these differences all participating contractors receive timely information on the winning bid and are able to determine differences between winning and losing bids.

Table 6: Publicly Released Bid Results from State Departments of Transportation for Highway Construction.

State	Public Bid Archive	Names and Bids of Contractors	Prices of Bid Items	Engineer's Estimate Reported
Alabama	X	X	X	-
Alaska	X	X	-	X
Arizona	X	X	X	X
Arkansas	X	X	X	X
California	X	X	X	X
Colorado	X	X	X	X
Connecticut	X	X	-	-
Delaware	X	X	X	X
Florida	X	X	X	-
Georgia	X	X	-	-
Hawaii	X	X	-	-
Idaho	X	X	-	-
Illinois	X	X	-	-
Indiana	X	X	X	X
Iowa	X	X	X	-
Kansas	X	X	X	-
Kentucky	X	X	X	X
Louisiana	X	X	X	X
Maine	X	X	-	-
Maryland	X	X	-	-
Massachusetts	X	X	-	-
Michigan	X	X	X	X
Minnesota	X	X	-	-
Mississippi	X	X	-	X
Missouri	X	X	-	-
Montana	X	X	-	X
Nebraska	X	X	X	-
Nevada	X	X	-	-
New Hampshire	X	X	X	-
New Jersey	X	X	-	-
New Mexico	X	X	X	-
New York	X	X	-	-
North Carolina	X	X	-	-
North Dakota	X	X	-	X
Ohio	X	X	-	X
Oklahoma	X	X	-	-
Oregon	X	X	-	-
Pennsylvania	X	X	-	-
Rhode Island	X	X	X	X
South Carolina	X	X	X	-
South Dakota	X	X	-	X
Tennessee	X	X	-	X
Texas	X	X	X	-
Utah	X	X	X	-
Vermont	X	X	X	-
Virginia	X	X	X	-
Washington	X	X	X	-
West Virginia	X	X	X	-
Wisconsin	X	X	X	-
Wyoming	X	X	-	X

Source: Information obtained from each state department of transportation.

An official from the Colorado Department of Transportation (CDOT) indicated that “disclosure of the bid tabs serves to improve the competition on our bids for both general contractors and their subcontractors.” CDOT is one of the departments that releases the names and bids of all participating contractors (on federally and state funded highway construction), the engineer’s estimate, and the contractor’s bid for each of the listed items.⁶⁴ Some of the information from a CDOT bid tabulation is reported in Table 7.

Table 7: Information from a CDOT Bid Tabulation, Federal Highway Maintenance Project, 2014.

Contractor	Bid Cost	Item: Asphalt Removal	Item: Excavation
APC Southern Construction Co. LLC	\$9,455,860.78	\$556,903.00	\$81,440.70
A+S Construction Co,	\$9,827,077.48	\$827,128.80	\$200,100.00
Difference =	\$371,216.70	\$270,225.80	\$118,659.30
Engineer’s Estimate	\$9,943,738.18	\$948,606.00	\$133,400.00

Source: Bid Results for Recently Let Projects, CDOT.

This information is for a highway maintenance (resurfacing) project on I-25 in rural, southeastern Colorado. Since the work on this interstate highway is federally funded, Davis-Bacon prevailing wages apply. This highway project requires resurfacing of approximately 10 miles of the highway. The contract letting date was on March 13, 2014 with a completion date on October 31, 2014. This resurfacing project required milling (asphalt removal), paving, rebuilding the bridge approach, and minor repairs to 10 structures. Two contractors bid on this project. The total bids for each contractor, the difference between their bids, prices for two selected items listed in the bid, and CDOT’s engineer’s estimate are included in Table 7. Each of the bids is less than CDOT’s cost estimate. The bid by APC Southern Construction Co. was

⁶⁴ Ibid.

approximately 95.1% of the engineer's estimate while the bid from A+S Southern Construction Co. was about 98.8%. APC Southern Construction Co. was awarded this project with a bid of approximately \$9.5 million that was about \$371,000 lower than the bid by A+S Southern Construction Co. For illustration, we have included two of the 90 items listed in the project bid tabulation. APC Southern Construction Co. included in their bid an estimated cost of approximately \$557,000 for the removal of asphalt and about \$81,000 for excavation work. The bids by A+S Construction Co. exceeded the estimates of the winning contractor for these two items by about \$389,000 (the sum of the differences for these two items or \$270,225.80 + \$118,659.30).

The information reported in the bid tabulations can be used by both contractors when considering future bids. For example, A+S Construction Co. can readily determine that the item prices for asphalt removal and excavation on this project were extraordinarily high and that differences in the prices of these items cost this contractor the project award. An examination of bid tabs from other resurfacing projects involving APC Construction Co. can be used by A+S Construction Co. to determine if these or other item prices should be re-evaluated to become more competitive. On the other hand, the bid results allow APC Southern Construction Co. to determine their winning margin for this and other projects. For example, this contractor can use this information to determine if they are "leaving money on the table," with bids that are consistently too low.

The bid results released by departments of transportation contain far more detailed and accurate information about how a contractor won a bid than can be obtained from the labor cost information contained in a certified payroll. The evidence, however, points to no apparent harm to participating contractors. Duncan, for example, examines highway resurfacing projects in

Colorado between 2000 and 2011 and finds that of the 132 resurfacing projects funded by the State of Colorado and the federal government, 115 of the projects were completed by contractors who won more than one resurfacing contract over the period.⁶⁵ If the release of sensitive bid information is associated with ruinous competition, we would expect far less repeat business by contractors.

California State Senate Bill 854 (SB 854) became effective on June 20, 2014.⁶⁶ This new program requires contractors to register and meet qualifications prior to bidding on state-funded public works projects and provides agencies and administrators of public works programs with a searchable data base of qualified contractors.⁶⁷ SB 854 also establishes procedures for the submission of certified payroll data by contractors to awarding agencies and to the California State Labor Commissioner and access to submitted wage information by employees and the public.

In implementing the new regulation, the State of California, Department of Industrial Relations (DIR) requires contractors and subcontractors on all public works projects to use an electronic certified payroll reporting system (eCPR). It is through the eCPR searchable database that the public may view and print out certified payrolls. Employee names, addresses and social security numbers are redacted from the publicly available information.⁶⁸

⁶⁵ Duncan. Ibid.

⁶⁶ See Senate Bill No. 854, Chapter 28. Accessed at: http://www.leginfo.ca.gov/pub/13-14/bill/sen/sb_0851-0900/sb_854_bill_20140620_chaptered.pdf.

⁶⁷ See News Release, "Department of Industrial Relations Launches Public Works Contractor Online Application System." July 1, 2014. Accessed at: <http://www.dir.ca.gov/DIRNews/2014/2014-55.pdf>.

⁶⁸ See "eCPR Search," DIR. Accessed at: <https://efiling.dir.ca.gov/eCPR/pages/search>. For a simple illustration of viewing a certified payroll, at the web site select a small county (Alpine) at the *County* prompt. Select the date of program inception (4-1-15) at the *Date Range From* prompt and the current date at the *Date Range To* prompt. Click *Search* and PDF copies of weekly and complete certified payrolls can be selected for public works completed in this county. Employee names, addresses, and social security numbers redacted. Other websites can be used to gather information for specific contractors and projects. See Public Works Contractor Registration Search, DIR. Accessed

Complete payroll data obtained from eCPR can be used to calculate a contractor's labor costs for a project. This information, theoretically, could be used by competitors to undercut bids on future projects. It can be argued that since payroll information is now available to all contractors, there is no relative competitive disadvantage. All contractors now have access to the information needed to undercut one another's bids.⁶⁹ This argument implies that universally releasing certified payrolls does not cause competitive harm, rather it is uneven or asymmetric access to payroll data that places some contractors at a disadvantage. On the other hand, the evidence presented in this study suggests that access to certified payrolls is of little use in bid undercutting and the policy change will not significantly affect contractor competition. It is too early to empirically determine if the policy change is affecting bids and resulting in competitive harm. However, it is clear that with access to certified payrolls, employees can easily, anonymously, and without fear of retaliation compare their wage payments from a public works contractor to the hours and earnings certified and reported by their employer. If a discrepancy exists, the employee can more easily pursue action to rectify the discrepancy.⁷⁰ Third parties may also use eCPR to access certified payrolls and monitor prevailing wage compliance.

IV. Conclusion

At first glance it may appear that certified payrolls could be used by a competitor to undercut the future bids of a contractor participating in Davis-Bacon projects. However, numerous factors conspire to make this an unproductive means of acquiring a competitive advantage. For example, labor costs are typically a low percent of total construction costs

at:

<https://efiling.dir.ca.gov/PWCR/Search.action?regYear=2016&legalName=&conCSLB=&caCounty=ALAMEDA&d-16544-p=17&defaultFiscalYear=2016®Number=> and Public Search Utility, DIR. Accessed at: <https://www.dir.ca.gov/pwc100ext/ExternalLookup.aspx>.

⁶⁹ Consequence of this would be lower bids after the introduction of HB 854.

⁷⁰ <http://www.dir.ca.gov/dlse/HowToFilePWComplaint.htm>

making this cost component of limited use in bid undercutting. Additionally, projects differ in size and technical characteristics rendering one project a poor estimate of the cost of another. While change orders cause the hours reported in a certified payroll to rise above the estimate of hours of work used in the preparation of the winning bid, off-site work may result in certified payrolls that do not accurately measure all of the time needed to complete a project.

Training data from academic studies indicate that skill and experience levels among nonunion construction workers vary widely. This suggests that worker productivity varies across contractors. The wage data presented above also indicates that worker productivity differs within a company. These differences also contribute to the difficulty in accurately estimating labor costs from certified payrolls. The uneven payment of benefits and omission of the owner's hours of work can also be associated with difficulties in using payroll data to estimate labor costs. Such estimations are also compounded when different job classifications are used and when these ratios change over time.

Previous academic research indicates that a host of bidder and project characteristics (project backlogs, bidder characteristics, and economic conditions) vary in such a way as to make bids a moving target from project to project. Furthermore, the ratios of different job classifications that contractors employ on a project vary with the technical characteristics of a project. Consequently, the information on job classifications and hours worked contained in a certified payroll do not reveal sensitive information regarding secret techniques employed by contractors. Finally, a case study of highway construction finds that state departments of transportation release detailed information about winning and non-winning bids. No evidence suggests that bidding contractors incur competitive harm from such practices.