

The Wage Differential Method: Promising Construction Costs Savings with the Repeal or Weakening of Prevailing Wage Laws that Cannot be Delivered.

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Study Abstract

The controversy over prevailing wage laws centers on whether these locally determined minimum wage rates increase construction costs. The “wage differential method” is commonly used to measure the cost effect of this wage policy. This study provides a step-by-step illustration of this approach through an examination of Davis-Bacon prevailing wage requirements and the cost of highway resurfacing in Colorado. This application of the wage differential method indicates that prevailing wage requirements add anywhere from 7% to 17% to project costs. The results of this illustration are compared to three studies that examine the same wage policy and projects, but are based on the statistical analysis of project data. These studies provide a comprehensive analysis and find consistent evidence that project costs are not related to prevailing wages. This illustration reveals the inherent flaws of the wage differential method and the need for a researcher using this approach to rely on assumptions, estimates, and inappropriate data. The result is a promise of construction cost savings with the repeal or weakening of prevailing wage laws that cannot be kept. The study also includes a critical review of existing wage differential studies and how this approach has been addressed in fiscal policy notes.

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Executive Summary

The main motivation for prevailing wage laws is to ensure that the infusion of government construction funding into an area does not adversely affect local construction labor markets.¹ The practice of awarding large government contracts to the lowest bidder may depress local wages by attracting contractors from areas where wage rates are lower. These contractors may undercut local wage rates by importing lower paid employees. In response, local contractors may force wages down to remain competitive. By protecting local compensation standards, prevailing wage laws establish a level playing field for all contractors bidding on government projects.

The controversy over prevailing wage laws centers on whether these locally determined minimum wage rates increase construction costs. The “wage differential method” is commonly used to measure the cost effect of prevailing wages. This study provides a step-by-step illustration of this approach through an examination of Davis-Bacon prevailing wage requirements and the cost of highway resurfacing construction in Colorado. The results of this illustration are compared to three studies that examine the same wage policy and projects, but are based on the statistical analysis of project data. This illustration reveals the inherent flaws of the wage differential method and the need for a researcher using this approach to rely on assumptions, estimates, and inappropriate data. The result is a biased measure of the cost of prevailing wage requirements that is too high.

The application of the wage differential method to highway resurfacing projects in Colorado indicates that Davis-Bacon prevailing wages add anywhere from 7% to 17% to construction costs. This finding contrasts with three studies that are based on the statistical analysis of actual resurfacing projects. These studies find that there is no difference in the cost of federally funded resurfacing projects that require prevailing wages and state-funded projects that are not covered by the wage policy.² Also, there is no difference in the level of bid competition between federal and state funded projects. Construction costs do not vary when contractors switch from state to federally funded resurfacing projects.³ The relative cost of federal projects does not change when prevailing wage rates shift from union to average rates.⁴ This revision in prevailing wages affected 85% of the detailed job classifications in highway resurfacing and represented an average 18% reduction in total hourly compensation for these jobs. Also, the level of bid competition did not change with the revision in prevailing wage rates. These studies examine the effect of prevailing wages from different perspectives, provide a comprehensive view of federal wage requirements, and uniformly find that there is no statistically significant prevailing wage impact on costs or competition.

¹ As an example see “The Davis-Bacon Act Protecting Wage Equality Since 1931,” Wage and Hour Division, U.S. Department of Labor. Accessed at: <http://www.dol.gov/whd/programs/dbra/Survey/conformancefaq.htm>.

² See Kevin Duncan, “The Effect of Federal Davis-Bacon and Disadvantaged Business Enterprise Regulations on Highway Maintenance Costs.” *Industrial and Labor Relations Review*, 2015, Vol. 68, No. 1, pp. 212-237. Accessed at: <http://ilr.sagepub.com/content/68/1.toc>.

³ See Kevin Duncan, “Do Federal Davis-Bacon and Disadvantaged Business Enterprise Regulations Affect Aggressive Bidding? Evidence from Highway Procurement Auctions.” Scheduled to appear in Issue 3, 2015 of the *Journal of Public Procurement*.

⁴ See Kevin Duncan, “Do Construction Costs Decrease When Davis-Bacon Prevailing Wages Change from Union to Average Rates?” 2015, Working Paper, Colorado State University-Pueblo.

This illustration reveals how the wage differential method produces a prevailing wage cost effect when the overwhelming evidence from studies based on superior methods indicates there is no such effect. Because of the flaws, errors, and built-in bias of the wage differential method, this approach should not be the basis of public policy decisions concerning prevailing wage laws.

The wage differential method requires the following steps:

1. Calculate the difference between prevailing wage rates and the wage rates that would be paid in the absence of the policy.
2. Calculate the share of labor costs to total construction costs for the types of projects covered by prevailing wages.
3. Multiply the answer from the first step by the results of the second step to obtain the percentage increase in costs due to prevailing wages.

For the occupations involved in highway resurfacing in Colorado, total hourly compensation under Davis-Bacon exceeds alternative compensation rates by 28%.⁵ Data from the *Economic Census of Construction* indicates that labor costs are 25.5% of total construction costs for highway, bridge, and street construction in Colorado.⁶ If wage and benefit rates are 28% higher on federal projects, and labor costs represent 25.5% of total construction costs, prevailing wage requirements increase costs by 7.14% (28% x 25.5%). Given the ease of this approach, the wage differential is often referred to as a “back of the envelope” estimate.⁷

While these steps are intuitive and simple, the first step reveals the built-in bias of the wage differential method. If prevailing wages are greater than the alternative wage, this method automatically produces results indicating that the wage policy is associated with increased construction costs. Essentially, the first step is a ‘loaded question.’ With the wage differential method, it is not a question of *if* prevailing wages increase construction costs. The built-in question is “how much do prevailing wages increase costs?” The wage differential method does not allow for more appropriate questions such as: Is there a cost difference due to prevailing wages and if so, how large is this cost difference? Studies based on statistical analysis allow for these questions. The preponderance of these studies finds that construction costs are not affected

⁵ Davis-Bacon rates for Denver and Douglas counties are used in this illustration and are available from Wage Determinations OnLine.gov. Accessed at: <http://www.wdol.gov/>. Wage rates from the *Occupational Employment Statistics*, U.S. Bureau of Labor Statistics for the Denver-Aurora-Broomfield metropolitan area are used as the alternative to Davis-Bacon rates. Accessed at: http://www.bls.gov/oes/current/oes_19740.htm#47-0000. These data do not include benefits (that are part of total compensation under Davis-Bacon). Estimates of hourly benefits were obtained from “Employer Costs for Employee Compensation – March 2015”, News Release, Table 10, U.S. Bureau of Labor Statistics, U.S. Department of Labor. Accessed at: <http://www.bls.gov/news.release/pdf/ecec.pdf>.

⁶ See Table 23A1, “Construction: Geographic Area Series: Detailed Statistics for the State: 2012,” 2012 Economic Census of the United States, U.S Census Bureau. Accessed at: http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ECN_2012_US_23A1&prodType=table.

⁷ See Peter Philips “Mr. Rosaen’s Magical Thinking: A Short Evaluation of Alex Rosaen’s 2013 Prevailing Wage Methodology,” Department of Economics Working Paper Series, University of Utah, November 20, 2013. Accessed at: https://ideas.repec.org/p/uta/papers/2013_12.html.

by prevailing wages.⁸ Consequently, it is very important to ask if there is a prevailing wage cost effect before attempting to measure it. Because of this built-in bias, the wage differential method is inherently unscientific.

The first step requires the comparison of prevailing wages to alternative rates that would be paid in the absence of the wage policy. Critics of prevailing wage laws argue that the wage policy protects union jobs and wages, implying that nonunion wage rates are the alternative to prevailing rates.⁹ However, this information is not publicly available and is very difficult to obtain. As a consequence, many wage differential studies use data from the *Occupational Employment Statistics* (hereinafter, OES) from the U.S. Bureau of Labor Statistics as the alternative to prevailing wages.¹⁰ No less an authority than the Commissioner of the Bureau of Labor Statistics has testified before the House of Representatives that the OES data are not designed for prevailing wage determinations.¹¹ If the OES wage data are not designed for prevailing wages, the use of these data as the market alternative is questionable.

The OES data are broad occupational averages and are a ‘blunt instrument’ when calculating differences between prevailing and alternative wage rates. The inability of the OES data to accurately represent an alternative to prevailing wages is revealed by the data for power equipment operators involved in highway resurfacing projects. Table E-1 includes Davis-Bacon, union, OES average, and nonunion hourly wage rates for selected job classifications. Since average rates prevail for these classifications, it is possible to calculate nonunion wages.¹² As expected, union rates exceed average prevailing wages. The gap between prevailing rates and OES average rates is significantly larger than the difference between prevailing wages and either estimate of nonunion rates. For example, the prevailing wage for operators of asphalt laydown equipment is about 119% of the OES wage (\$22.67/\$19.11). This same Davis-Bacon rate is about 105% of the nonunion rate (\$22.67/\$21.67). These data reveal that the commonly used OES data are an inaccurate measure of the alternative to prevailing wages. These data also

⁸ See Kevin Duncan, (forthcoming). “A Review of the Research on the Effect of Prevailing Wages on Construction Costs, Safety, Training, and the Racial Composition of the Construction Labor Force,” Institute for Construction Economics Research.

⁹ For an example, see George Leef, “Prevailing Wage Laws: Public Interest or Special Interest Legislation?” *Cato Journal*, Vol. 30, No. 1, 2011, pp. 137-154.

¹⁰ For examples, see Sarah Glassman, MSEP, Michael Head, MSEP, David Tuerck, Ph. D., and Paul Bachman, MSIE. “The Federal Davis-Bacon Act: The Prevailing Mismeasure of Wages,” Beacon Hill Institute, February 2008. Accessed at: <http://www.beaconhill.org/BHIStudies/PrevWage08/DavisBaconPrevWage080207Final.pdf> and See Kent Gardner, Ph. D. and Rochelle Ruffner, Ph. D., “Prevailing Wage in New York State: The Impact of Project Costs and Competitiveness,” Center for Government Research, January 2008. Accessed at: <http://reports.cgr.org/download-single-report/1532>.

¹¹ See “Statement of Erica Groshen, Commissioner, Bureau of Labor Statistics, U.S. Department of Labor Before the Subcommittee on Workforce Protections, Committee on Education and the Workforce, U.S. House of Representatives.” June 18, 2013. Accessed at: http://www.bls.gov/bls/congressional_testimony/groshen06182013.htm.

¹² In this case, the formula is: Prevailing Wage = P x Union Wage + (1-P x X), where P = the percent representation of the union wage in the determination of the prevailing wage. Since the average wage prevails, the union rate cannot represent more than 50% of the prevailing rate. Solving the equation for X provides an estimate of the average nonunion wage. This wage is estimated at the extremes when union rates are 50% and 1% of the prevailing wage. The Davis-Bacon average prevailing wage is weighted by the total employed in a classification. It is not possible to replicate the weights. Consequently, the method used here provides an estimate of the average, unweighted nonunion wage. Union wage data was obtained from the state-wide master agreement for Operating Engineers Local # 9 in Colorado.

illustrate how the use of OES wage information in the first step of the wage differential method results in a wage difference that is too large.¹³

Table E-1. Davis-Bacon, OES, and Estimated Nonunion Average Wages, Highway Resurfacing Job Classifications, Denver and Douglas Counties, Colorado.

Job Classification	Davis-Bacon Wage	Union Wage Rate	OES AVERAGE WAGE	Nonunion Wage Rate ^a	Nonunion Wage Rate ^b
Asphalt Laydown	\$22.67	\$23.67	\$19.11	\$21.67	\$22.66
Asphalt Roller	\$23.13	\$23.67	\$19.11	\$22.59	\$23.12
Asphalt Spreader	\$22.67	\$23.67	\$19.11	\$21.67	\$22.66
Broom/Sweeper	\$22.47	\$23.67	\$21.64	\$21.27	\$22.46
Grader/Blade	\$22.67	\$23.67	\$21.64	\$21.67	\$22.66
Oiler	\$23.73	\$23.82	\$19.11	\$23.64	\$23.73
Asphalt Screed	\$22.67	\$23.67	\$19.11	\$21.67	\$22.66

^a Estimate of the nonunion average wage when the union wage is 50% of Davis-Bacon prevailing average wage. ^b Estimate of the nonunion average wage when the union wage is 1% of Davis-Bacon prevailing average wage. Sources: Wage Determinations OnLine.gov and *Occupational Employment Statistics*, Bureau of Labor Statistics, Operating Engineers Local #9 of Colorado.

In this illustration, the second step of the wage differential method is based on data from the *Economic Census of Construction*. These are the most complete, publicly available cost data for the construction industry and indicate that labor costs are 25.5% of total construction costs for the category that includes highway resurfacing. Some wage differential studies include only labor and material costs and assume that labor costs are 50% of the total.¹⁴ Using 50% labor costs in the current example suggests that Davis-Bacon wage requirements increase “total” construction costs by 14% (28% x 50%). This is approximately twice the increase obtained when data from the *Economic Census of Construction* are used.¹⁵ If actual material costs for highway, bridge, and street construction in Colorado are used as the measure of “total” construction costs, the impact of Davis-Bacon wage regulations is 17%. When incomplete measures of total construction costs are included in the wage differential method, this approach promises a cost savings with the repeal or weakening of prevailing wage laws that cannot be delivered.

In estimating the cost impact of prevailing wages, the wage differential method only considers differences in wage rates. However, numerous other cost differences are present when wages differ in the construction industry. For example, an examination of construction costs in states with different prevailing wage policies indicates that where wages are higher, material and

¹³ The OES wage data include the earnings of apprentices, seasonal workers, and lower skilled residential construction workers that contribute to a wage gap between prevailing wages and OES averages that is too large. The problems with the use of the OES data in the wage differential method are described in more detail in the section entitled “Step-By-Step Application and Analysis of the Wage Differential Method.”

¹⁴ For examples, see the studies by the Beacon Hill Institute and the Center for Government Research. Ibid.

¹⁵ The *Economic Census of Construction* includes the costs of materials, fuels, lubricants, rental equipment, administrative worker salaries, purchased services, and a residual measure of contractor profit (the difference between the value of construction and total construction costs). See Table 23A1, *Economic Census of Construction*. Ibid.

fuel costs are lower, as are profit rates.¹⁶ Higher wages imply the use of more productive construction workers and more efficient, less costly construction with respect to materials and fuels expenditures. Also, with higher labor costs, contractors may seek efficiencies in material and fuel costs to remain competitive.¹⁷ This illustrates another bias in the wage differential method. By focusing exclusively on labor costs, the wage differential method ignores changes in other cost components. By ignoring these other changes, this approach yields a cost estimate that is too high.

Academic studies indicate that when wages increase, more skilled workers easily replace less skilled workers at construction job sites.¹⁸ Additionally, when wages increase in the construction industry, more capital equipment is used instead of construction labor.¹⁹ When construction wages increase, for whatever reason, more productive workers are used along with more equipment. Once again, these types of changes are ignored when the wage differential method is used. However, these changes affect overall construction costs. When wages increase, labor productivity increases while the number of construction worker decreases. The wage differential method is based on the assumption that neither of these changes takes place. But, increased productivity and reductions in employment mitigate the cost impact of increased wage rates. While changes take place that reduce labor costs, the use of equipment and corresponding costs increase with an increase in wage rates. It is beyond the scope of the wage differential method to account for the net effect of all of these changes. The recognition that a variety of cost components decrease and increase with changes in wage rates demonstrates that the cost effect of prevailing wages should not be measured with the wage differential method.

The wage differential method has been used recently by state legislatures considering changes to prevailing wage laws.²⁰ Several research institutions have also used this method. The studies by these non-governmental organizations are listed in Table E-2.

Table E-2. Selected Wage Differential Studies and Prevailing Wage Cost Estimates.

Organization, Author(s), Year	Prevailing Wage Law Examined	Estimated Cost Increase
Anderson Group, LLC. Alex Rosaen, 2013 .	State of Michigan	7.5%

¹⁶ See Kevin Duncan and Alex Lantsberg, “How Weakening Wisconsin’s Prevailing Wage Policy Would Affect Public Construction Costs and Economic Activity,” May 22, 2015. 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>.

¹⁷ See the section heading, “Other Factors that Change with Wage Rates” for a complete explanation of these data.

¹⁸ See William Blankenau and Steven Cassou, “Industry Differences in the Elasticity of Substitution and Rate of Biased Technological Change between Skilled and Unskilled Labor.” *Applied Economics*, 2011, Vol. 43, pp. 3129-3142.

¹⁹ See Edward Balistreri, Christine McDaniel and Eina Vivian Wong, “An Estimation of U.S. Industry-Level Capital-Labor Substitution Elasticities: Support for Cobb-Douglas.” *The North American Journal of Economics and Finance*, 2003, Vol. 14, No. 3, 343-356.

²⁰ See examples from Kentucky, Maryland, and Vermont see the section heading “Studies Based on the Wage Differential Method.”

Columbia University, Julia Vitullo-Martin, 2012 .	State of New York	25%*
Beacon Hill Institute, Glassman, Head, Tuerck, and Bachman, 2008 .	Davis-Bacon Act	9.9%
Center for Government Research, Kent Gardner and Rochelle Ruffer, 2008 .	State of New York	36%
Citizens Housing and Planning Council, Roistacher, Perine, and Shultz, 2008 .	State of New York	25%
Mackinac Center for Public Policy, Paul Kersey, 2007 .	State of Michigan	10% to 15%
Mackinac Center for Public Policy, John Taylor, 2007 .	State of Michigan	7.2%
Mackinac Center for Public Policy, Richard Vedder, 1999 .	State of Michigan	10%

*Based on the estimate reported in Citizens Housing and Planning Council, 2008.

The studies by the Anderson Group and by John Taylor of the Mackinac Center for Public Policy provide cost estimates similar to that obtained by the application of the wage differential method to highway resurfacing construction in Colorado (about 7%). The estimates from all studies range up to 36% (Center for Government Research). This latter estimate is unrealistically too high as data from the *Economic Census of Construction* indicate that labor costs as a percent of total construction costs for the entire industry in New York State is 22.7%. The results reported by the Center for Government Research imply that workers on prevailing wage projects in New York would not only need to work for free, but would also need to kick-back about 14% of their potential earnings to obtain a savings of 36% if wage policy were repealed. The study by the Citizens Housing and Planning Council has the same problem with a 25% cost impact. These studies illustrate the problem when the back of the envelope wage differential method is used without checking basic information about the construction industry.

The cost estimate by the Citizens Housing and Planning Council was based on modified data from the Center for Government Research study. In turn, the Council's figures are the basis of the prevailing wage cost impact reported in the Columbia University study. Both of the studies by Columbia University and the Citizens Housing and Planning Council have been referenced in opposition to expanding prevailing wage laws to the construction of all low-income

housing in New York.²¹ This is not the only situation when wage differential studies have been used to influence public policy. James Sherk of the Heritage Foundation referenced the 1999 Mackinac Center study, the Beacon Hill Institute report, and the Citizens Housing and Planning Council study in his 2015 testimony before the Indiana State Senate.²² Mr. Sherk also referenced the Beacon Hill Institute study during his testimony before the U.S. House of Representatives in 2011.²³

None of the wage differential studies listed in Table E-2 have been peer-reviewed. This type of review involves the evaluation of a study by one or more researchers with similar competence to those who produced the research. A peer review does not mean that the reviewers agree with the findings. Rather, the purpose of the review is to insure quality, provide credibility, and maintain standards in the discipline. There are far too many errors and shortcomings associated with the wage differential method to pass this type of review. Additionally, a peer-review would involve experts, who don't all agree on the effect of prevailing wages, but do agree that the wage differential method is inappropriate.²⁴

The wage differential method is intuitive, simple, and attractive when policy is being considered and time constraints prevent a more thorough analysis. However, studies utilizing this method are based on an incomplete understanding of the construction industry, overstate the wage gap between prevailing wages and alternative market wage rates, ignore mitigating factors that change with wage rates in the construction industry, underestimate total construction costs, and promise cost savings with the repeal or weakening of prevailing wages that cannot be delivered.

Several wage differential studies assert that high prevailing wages reduce employer demand for construction workers. Also, by increasing costs and reducing the number of projects, prevailing wages further reduce employment in the industry. For example, the Mackinac study by Richard Vedder reports that construction employment increased during the period when Michigan's prevailing wage law was suspended. The suspension occurred between December 1994 and June 1997 when annual growth in construction employment averaged over 17,000 jobs. This contrasts to the selected period before repeal (June 1992 to December 1994) when average growth in the industry was 4,000 jobs annually. Additionally, the study by the Citizens Housing & Planning Council implies that 25% higher construction costs due to prevailing wages would

²¹ See "Memorandum of Opposition: S.7549 (Lanza) / A.10387 (V. Lopez) Prevailing Wage Mandate on Private Affordable Housing Projects," June 15, 2012. Accessed at: <http://nysafah.org/cmsBuilder/uploads/Coalition-Memo-to-be-printed.pdf>.

²² See James Sherk, Ph. D., "How the Common Construction Wage Affects the Cost and Quality of Construction Projects," the Heritage Foundation, July 24, 2015. Accessed at: <http://www.heritage.org/research/all-research?categories=testimony>.

²³ See James Sherk, Ph. D., "Examining the Department of Labor's Implementation of the Davis-Bacon Act," The Heritage Foundation, April 28, 2011. Accessed at: <http://www.heritage.org/research/all-research?categories=testimony>.

²⁴ The wage differential method was commonly used in the 1980s before the availability of more advanced statistical software. The last peer-reviewed study based on the wage differential method was published in 2001. See Edward Keller and William Hartman, "Prevailing Wage Rates: The Effects on School Construction Costs, Levels of Taxation, and State Reimbursements," *Journal of Education Finance*, 2001, Vol. 27, No. 2, pp. 713-728.

require either larger government subsidies for low-income housing, renting to families with higher incomes, or cutting the number of housing units by 50%.

The purported job loss due to prevailing wages can be illustrated using the data from the application of the wage differential method to a highway resurfacing construction in Colorado. A 7% increase in the cost of highway resurfacing projects, as estimated by the wage differential method, represents approximately \$27 million of the \$386 million that the Colorado Department of Transportation received for the 2009 American Recovery and Reinvestment Act. This cost is equal to that of a large highway construction project that would employ about 105 construction workers.²⁵ On the other hand, the results of the three statistical studies that examine the cost effect of Davis-Bacon regulations indicate that prevailing wages do not affect costs. If there is no cost effect, there is no decrease in employment or in the number of construction projects.

The claim that weakening or repealing prevailing wages will increase construction employment is at odds with the empirical analysis of the economic impact of the wage policy. Results of a recent study indicate that repeal of Michigan's prevailing wage law would reduce state-level economic activity by \$1.7 billion, reduce state-wide employment by over 11,000 jobs, and reduce construction employment by over 4,000 jobs.²⁶ While repeal would alter spending in the construction industry by reducing construction worker earnings and benefits, increasing material and fuel costs, and contractor profits, the largest aspect of the impact is due to the increase in construction completed by out-of-state contractors. States with weak or no prevailing wage laws have about 2% more construction work completed by contractors from other states. Michigan would expect to have an additional \$670 million in construction completed by contractors from other states each year after the repeal of prevailing wages. The leakage of construction spending out of the state would ripple through the rest of Michigan's economy affecting all industries in the state. Rather than decreasing construction activity and employment, prevailing wages protect local contractors, construction workers, and economies by performing the basic function of protecting local wage rates.

Introduction

The primary purpose of prevailing wage laws is to ensure that construction workers will not see their wages and benefits undercut as a result of government spending practices.²⁷ The infusion of large amounts of federal or state dollars into a location, along with a process that

²⁵ The description of how the employment impact is measured is presented in the section heading "Prevailing Wages and Construction Industry Employment."

²⁶ "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 As an example see "The Davis-Bacon Act Protecting Wage Equality Since 1931," Wage and Hour Division, U.S. Department of Labor. Accessed at: <http://www.dol.gov/whd/programs/dbra/Survey/conformancefaq.htm>.

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, prevailing wage laws establish a level playing field for all contractors bidding on covered projects.

At the federal level, the U.S. 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 construction is performed.²⁸ Surveys are dependent upon the voluntary submission of information from contractors and other parties that have been involved in construction work within the time frame and geographic scope of the wage survey. If a majority of the workers in a detailed job classification are paid the same, this rate is the prevailing wage. If there is no majority wage rate, the average of the wages paid, weighted by the total employed in that classification, is the prevailing wage.²⁹ 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 to every covered construction contract with the federal government that is in excess of \$2,000.

Thirty states and numerous municipalities have prevailing wage policies.³⁰ These jurisdictions employ a variety of methods to determine prevailing wage rates. For example,

²⁸ 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/pwrb/Tab12DBSurveys.pdf>.

²⁹ Davis-Bacon prevailing wage rates are reported at Wage Determinations On-Line.gov. Accessed at: <http://www.wdol.gov/>.

³⁰ For a list of states with and without prevailing wage laws see "Dollar Threshold Amount for Contract Coverage Under State Prevailing Wage Laws," Wage and Hour Division, U.S. Department of Labor. Accessed at: <http://www.dol.gov/whd/state/dollar2011.htm#1>. This information is from 2011. Since 2011 Indiana repealed its prevailing wage law in 2015 with West Virginia repealing in 2016. At the time of this report the status of prevailing wage laws in Michigan is yet to be determined.

Maine utilizes their own wage survey while Connecticut and Rhode Island follow federal Davis-Bacon rates.³¹ New York sets prevailing wages based on applicable collective bargaining agreements. The City and County of Denver uses Davis-Bacon rates.³²

The controversy over prevailing wage laws centers on whether these locally determined minimum wage rates are associated with increased construction costs. This study examines one of the most frequently used methods of measuring the cost of prevailing wages, the “wage differential” method. In the following sections of this report, studies that use the wage differential method are critically reviewed. The method is illustrated by applying the approach to an examination of the impact of Davis-Bacon prevailing wages on the cost of highway resurfacing in Colorado. The results of this application are compared to the findings of three studies of these same highway projects. These studies utilize alternative statistical techniques to determine the cost impact of Davis-Bacon wage requirements. The step-by-step illustration of the wage differential method reveals the built-in bias of this approach, the need for the researcher using this method to assume and estimate rather than rely on accurate data, and numerous other limitations that result in entirely inaccurate measurement of the cost effect of prevailing wages.

The wage differential method is intuitive, simple, and attractive when policy is being considered and time constraints prevent a more thorough analysis. Studies utilizing this method are based on an incomplete understanding of the construction industry, overstate the wage gap between prevailing wages and alternative market wage rates, ignore mitigating factors that change with wage rates in the construction industry, underestimate total construction costs, and

³¹ See “Vermont Department of Labor: 2013 Study Report on Vermont’s Prevailing Wage,” Vermont Department of Labor, January 14, 2014. Accessed at: <http://www.leg.state.vt.us/reports/2014ExternalReports/296110.pdf>.

³² See “Sec, 20-79 The Payment of Prevailing Wages,” City and County of Denver. Accessed at: http://www.denvergov.org/Portals/741/documents/PW_General/20-76%20Prevailing%20Wage.pdf.

promise a cost savings with the repeal or weakening of prevailing wages that cannot be delivered. As a consequence, the use of this method in the public policy debate on prevailing wages should be avoided.

Studies Based on the Wage Differential Method

Opponents of prevailing wage laws often claim that the wage standard increases the cost of public construction. These claims are often accompanied by a cost estimate. For example, during the 2013-2014 legislative session a Washington state representative asserted that the state-level prevailing wage policy increased the cost of building schools and roads by as much as 35%.³³ While there is no explanation of how this projection was obtained, many other estimates rely on the “wage differential” method.

The process of evaluating proposed changes to Vermont’s prevailing wage policy is a good way to explain what the wage differential method is and how it is used. During the 2015 legislation session, Vermont’s “Capital Bill” sought to switch from prevailing wages that did not include benefits to federal Davis-Bacon wage and benefit rates.³⁴ In estimating the effect of this change, the Vermont Legislative Joint Fiscal Office estimated that Davis-Bacon rates exceeded current prevailing wage rates by 20% to 30% and that labor costs represented 32% of total construction costs.³⁵ With this information the estimate of the cost effect is straight forward. If Davis-Bacon rates are 20% higher than existing prevailing wage rates and labor costs are 32% of

³³ See “Manweller: New School Construction Should be Exempt from Wage Law,” iFiber One News, January, 31, 2013. Accessed at: http://www.ifiberone.com/news/grantcounty/george/manweller-new-school-construction-should-be-exempt-from-wage-law/article_b6ac9e82-6bd1-11e2-b085-001a4bcf6878.html.

³⁴ See “Prevailing Wage Mandate Tacked onto \$157 million Capital Bill,” VTDigger.org. May 8, 2015. Accessed at: <http://vtdigger.org/2015/05/08/senate-approves-157-million-capital-bill/>.

³⁵ See “Components of the Capital Bill-Prevailing Wage,” Fiscal Note-Revised, Vermont Legislative Joint Fiscal Office, July 24, 2015. Accessed at: http://www.leg.state.vt.us/jfo/fiscal_notes/2015_H_492%20Prevailing%20Wages%20Fiscal%20Note%20%28Revised%29%203-25-2015.pdf.

total construction costs, then the switch to federal rates would increase costs by 6.4% (20% x 32%). Given the ease of this approach, the wage differential is often referred to as a “back of the envelope” estimate.³⁶ The Joint Fiscal Office also estimated that if average capital bill authorizations are \$72 million, the change in prevailing wages would increase expenditures by \$4,608,000 (6.4% x \$72 million).

The wage differential method has been used recently by other state legislatures. The Maryland Department of Legislative Services used this method during the 2014 session when an increase in the prevailing wage coverage threshold was considered. Previous policy required the payment of prevailing wages when the state paid 50% of a school’s construction costs.³⁷ The proposed policy sought to increase the percentage to 75%. This change would reduce the number of school construction projects that would require the payment of prevailing wages. While recognizing recent empirical research reporting that prevailing wage laws do not have a statistically significant effect on costs, that the effect of prevailing wages may vary by project, and that the cost effect may be negligible in some cases, the Department estimated that prevailing wages add approximately 2.5% to project costs. This is based on the assumption that prevailing wages exceed the alternative “market” wage rate by 10% and that labor costs range between 20% and 30% of total costs. Using the midpoint of 25% labor costs, prevailing wages add 2.5% to construction costs (10% x 25%). The initial estimate was adjusted further to 2% to 5%.

³⁶ See Peter Philips “Mr. Rosaen’s Magical Thinking A Short Evaluation of Alex Rosaen’s 2013 Prevailing Wage Methodology,” Department of Economics Working Paper Series, University of Utah, November 20, 2013. Accessed at: https://ideas.repec.org/p/uta/papers/2013_12.html.

³⁷ See “Procurement-Prevailing Wage-School Construction,” Fiscal and Policy Note, Department of Legislative Services. Accessed at: http://mgaleg.maryland.gov/2014RS/fnotes/bil_0008/sb1068.pdf.

In the 2015 legislative session, the Legislative Research Commission estimated that exempting education construction from Kentucky's prevailing wage law would reduce the cost of building elementary and secondary school projects by approximately 7.6%.³⁸ This estimate is based on an average wage differential for workers employed on prevailing wage projects of 25.7% and an average measure for labor costs as a percent of total construction costs of 29.5%. Calculating the overall cost increase due to prevailing wages is straight forward ($25.7\% \times 29.5\% = 7.6\%$).

Other state legislatures have avoided the use of the wage differential method in estimating the cost of a policy change. In evaluating Assembly Bill 32 that would eliminate prevailing wages in Wisconsin, the Legislative Fiscal Bureau distinguished between studies based on the wage differential approach and those using other research methods. Excluding the wage differential studies, the Bureau found that "the evidence on prevailing wage effects generally range from relatively small effects to no statistically significant effects."³⁹ The experience from Wisconsin reveals that legislatures have alternatives to the wage differential method when evaluating the cost implications of changes in prevailing wage policy.⁴⁰

Organizations other than state legislative councils have employed the wage differential method. A 1999 study by Richard Vedder, Ph. D. of the Mackinac Center for Public Policy

³⁸ See "Commonwealth of Kentucky Fiscal Note Statement, Senate Bill 9," Legislative Research Commission, 2015 Regular Session. Accessed at: <http://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=3&ved=0CCwQFjAC&url=http%3A%2F%2Fwww.lrc.ky.gov%2Frecord%2F15rs%2F9%2F9.doc&ei=1bYJVfXQCMSIsQSI3oCwBA&usg=AFQjCNHwNPx3Xse1iL>.

³⁹ Legislative Fiscal Bureau. 2015. "Prevailing Wage Laws and 2015 Assembly Bill 32." Page 9. Accessed at: http://www.wispolitics.com/1006/FB_Memo.pdf.

⁴⁰ For an accessible review of the literature on prevailing wage laws see Kevin Duncan. 2016. "A Guide to Understanding the Research on the Impact of Prevailing Wage Laws on Construction Costs, Training and Injury Rates in the Construction Industry, and the Racial Composition of Construction Labor Markets." Institute for Construction Economics Research.

found that Michigan's prevailing wage law added 10% to the cost of public construction.⁴¹ This is based on a comparison of prevailing wage rates and "free market" wages with the former exceeding the latter by over 50%.⁴² With labor costs estimated to be 25% of project total costs and using a "conservative" 40% increase in wage rates due to prevailing wages, the wage policy increases total construction costs by 10% (25% x 40%). A 2007 study by John Taylor, Ph. D. of the Mackinac Center calculated that Michigan's prevailing wage law added 7.2% to construction costs.⁴³ This estimate is based on the assumption that labor costs represent 20.6% of total costs and that prevailing wages are 35% higher than alternative wages. Based on these figures, the law adds 7.2% (20.6% x 35%).

A 2013 study by the Anderson Economic Group calculated that construction costs for K-12 and higher education would decrease by 7.5% if the State of Michigan repealed its prevailing wage law.⁴⁴ Based on Anderson Economic Group's professional judgment of empirical studies, labor costs were determined to be 30% of total costs with prevailing wages exceeding average wages by 25%. Or, the wage policy adds 7.5% to costs (30% x 25%).

These studies by the Mackinac Center for Public Policy and by the Anderson Economic Group rely very little on publicly available data and depend more on assumptions, estimates, or professional judgments when calculating the costs of prevailing wages. Other studies use publicly available data to estimate the difference between prevailing wage rates and market rates

⁴¹ See Richard Vedder, Ph. D. "Michigan's Prevailing Wage Law and Its Effects on Government Spending and Construction Employment," A Mackinac Center Report, September 1999. Accessed at: <https://www.mackinac.org/archives/1999/s1999-07.pdf>.

⁴² Free market wage rates were provided by the Michigan Housing Council.

⁴³ See John Taylor, Ph. D. 2007. "Prevailing Wage Laws," Mackinac Center for Public Policy, April 16, 2007. Accessed at: <http://www.mackinac.org/8473>.

⁴⁴ See Alex L. Rosaen. 2013. "The Impact of Michigan's Prevailing Wage Law on Education Construction Expenditures." Prepared by the Anderson Economic Group, LLC, November 13, 2013. Accessed at: <http://prevailingwagetruth.com/wp-content/uploads/2013/11/AEG-Report-MI-PW-Law-and-Education-Construction-2.pdf>.

that would apply in the absence of the wage policy. These studies use data from the Occupational Employment Statistics provided by the Bureau of Labor Statistics as the measure of alternative market wage rates.⁴⁵ For example, in a 2007 study by Paul Kersey, J. D. of the Mackinac Center for Public Policy, prevailing hourly wages are compared to OES wage data for comparable construction occupations.⁴⁶ This analysis finds that prevailing wages exceed OES wages by 40% to 60%. This study also uses data from the Economic Census of Construction to obtain a measure of labor costs as a percent of total costs (25%). If prevailing wages add 40% to labor costs and labor costs are 25% of overall costs, Michigan's prevailing wage law adds 10% to costs ($25\% \times 40\% = 10\%$). If the wage policy adds 60% to wage rates, the addition to project cost is 15% ($25\% \times 60\%$).

A 2008 study by the Beacon Hill Institute compared OES hourly wage rates to Davis-Bacon rates in metropolitan areas and found that federal prevailing wage rates exceed OES average wage rates by 22%.⁴⁷ Using a hypothetical project with 50% labor costs and 50% material costs, the authors calculate that Davis-Bacon wage requirements add 9.9% to total project costs.⁴⁸

⁴⁵ These data and their applicability to alternatives to prevailing wages is discussed below.

⁴⁶ See Paul Kersey, J. D., "The Effect of Michigan's Prevailing Wage Law," Mackinac Center for Public Policy, August 27, 2007. Accessed at: <http://www.michigancapitolconfidential.com/8907>.

⁴⁷ See Sarah Glassman, MSEP, Michael Head, MSEP, David Tuerck, Ph. D., and Paul Bachman, MSIE. "The Federal Davis-Bacon Act: The Prevailing Mismeasure of Wages," Beacon Hill Institute, February 2008. Accessed at: <http://www.beaconhill.org/BHISTudies/PrevWage08/DavisBaconPrevWage080207Final.pdf>.

⁴⁸ This is based on a hypothetical \$2.44 billion project with \$1.22 billion in labor and material costs (each). Since Davis-Bacon adds 22% to costs, switching to OES data would reduce labor costs to \$1 billion and total costs fall to \$2.22 billion. This formula is used to derive the percentage change $(\$2.44/\$2.22) - 1 = 9.91\%$. This differs from the typical application of the same data that would yield a cost estimate of 11% ($22\% \times 50\%$).

Also in 2008, the Center for Government Research found that prevailing wages added 36% to the typical project in New York State.⁴⁹ This is based on a comparison of OES wages (plus a 25.8% benefit rate) and prevailing wages under the state's policy. The study reports that prevailing wages increase labor costs from 38% to 50% in the upstate region and as much as 100% in Long Island. Based on a hypothetical project with 50% labor and material costs, prevailing wages increased project costs by 23% in upstate New York and by 55% in Long Island with a state-wide average of 36%.⁵⁰ These estimates are unrealistically too high as data from the 2007 Economic Census of Construction indicates that for all construction in New York, labor costs were only 22.7% of total construction costs. Given this level of labor costs, the results of the Center for Government Research study imply that construction workers would not only need to work for free on state projects in New York, but would also need to kick-back between 13%-14% of their potential earnings to obtain the reported state-wide cost savings of 36%. This example illustrates the problem when this "back of the envelope" method is used without checking basic information about the construction industry.

Using modified calculations from the Center for Government Research report, the Citizen's Housing and Planning Council calculates that New York's prevailing wage standard adds up to 25% to the cost of low income housing.⁵¹ Once again this prevailing wage cost estimate exceeds labor costs as a percent of total construction costs in New York State (22.7%) implying that even if construction workers worked for free on low income housing projects, a

⁴⁹ See Kent Gardner, Ph. D. and Rochelle Ruffner, Ph. D., "Prevailing Wage in New York State: The Impact of Project Costs and Competitiveness," Center for Government Research, January 2008. Accessed at: <http://reports.cgr.org/download-single-report/1532>.

⁵⁰ There is no discussion of the specific formula used to obtain these figures. But, if average labor costs are 53.73% and prevailing wages increase labor costs by an average of 67%, total project costs increase by 36% (53.73% x 67%)

⁵¹ Elizabeth A. Roistacher, Ph. D., Jerilyn Perine and Harold Schultz, *Prevailing Wisdom: The Potential Impact of Prevailing Wages on Affordable Housing*, Citizens Housing & Planning Council, New York (December 2008). Accessed at: <http://chpcny.org/wp-content/uploads/2011/02/Prevailing-Wisdom-web-version1.pdf>.

savings of 25% could not be attained. Proceeding with the cost estimate of 25%, the Council estimates that prevailing wages cut the number of units built by half or increase building costs between \$62,500 and \$312,500 per unit. Without a prevailing wage standard a family earning \$35,000 could afford low-income housing. A family would have to earn at least \$51,000 to cover the cost of units built under the wage policy. This would be compelling evidence that prevailing wages are inconsistent with the goals of low-income housing, except that the prevailing wage cost estimate is unrealistically too high.

The results of the study by the Citizen's Housing and Planning Council are used as the cost estimate in the recent report by the Center for Urban Real Estate at Columbia University and form part of the basis of the criticism of the wage policy expressed in this report.⁵² Both of the studies by Columbia University and the Citizen's Housing and Planning Council have been referenced in opposition to expanding prevailing wage laws to the construction of all low-income housing in New York.⁵³ This is not the only situation when wage differential studies have been referenced in public policy decisions regarding prevailing wages. James Sherk, Ph. D. of the Heritage Foundation referenced the 1999 Mackinac Center study, the Beacon Hill Institute report, and the Citizen's Housing and Planning Council study in his 2015 testimony before the

⁵² See page 4 of Julia Vitullo-Martin, Ph. D., "The Complex Worlds of New York Prevailing Wage," The Center for Urban Real Estate, GSAPP, Columbia University, June 5, 2013. Accessed at: <http://www.arch.columbia.edu/files/gsap/imceshared/tct2003/PrevailingWage.pdf>.

⁵³ See "Memorandum of Opposition: S.7549 (Lanza) / A.10387 (V. Lopez) Prevailing Wage Mandate on Private Affordable Housing Projects," June 15, 2012. Accessed at: <http://nysafah.org/cmsBuilder/uploads/Coalition-Memo-to-be-printed.pdf>.

Indiana State Senate.⁵⁴ Dr. Sherk also referenced the Beacon Hill Institute study during his testimony before the U.S. House of Representatives in 2011.⁵⁵

While the simplicity of the wage differential approach makes it attractive when policy is being considered and time constraints prevent a more thorough analysis, it is a fatally flawed method of estimating the cost impact of prevailing wage laws because it is based on an incomplete understanding of how changes in wage rates are associated with numerous other changes in the construction industry. Evidence that is more fully described below indicates that when wages increase more productive construction workers and capital equipment are utilized on construction sites. Also, material and fuel costs are lower, as are contractor profits. Ignoring these other changes is one reason why the cost estimates obtained from the wage differential method are at odds with the estimates based on statistical methods that take the factors that change with wage rates into account. The preponderance of the statistics-based research indicates that construction costs are not affected by prevailing wages.

To illustrate more fully the problems associated with the wage differential method, this approach will be used to calculate the cost of Davis-Bacon prevailing wage requirements on federal highway resurfacing projects in Colorado. This step-by-step illustration reveals how sensitive the measured prevailing wage cost effect is to the assumptions and estimates a researcher must make when using this method. The results of the wage differential method will be compared to three studies that use statistical methods to examine the effect of Davis-Bacon prevailing wages on highway resurfacing projects in Colorado. Contrary to the wage

⁵⁴ See James Sherk, Ph. D., "How the Common Construction Wage Affects the Cost and Quality of Construction Projects," the Heritage Foundation, July 24, 2015. Accessed at: <http://www.heritage.org/research/all-research?categories=testimony>.

⁵⁵ See James Sherk, Ph. D., "Examining the Department of Labor's Implementation of the Davis-Bacon Act," The Heritage Foundation, April 28, 2011. Accessed at: <http://www.heritage.org/research/all-research?categories=testimony>.

differential approach, these statistical studies are based on the empirical examination of actual project data that eliminates the reliance of assumptions and other subjective decisions by the researcher.

Step-By-Step Application and Analysis of the Wage Differential Method

The wage differential method requires the following steps:

1. Calculate the difference between prevailing wage rates and the wage rates that would be paid in the absence of the wage policy.
2. Calculate the share of labor costs to total construction costs for the types of projects covered by prevailing wages.

While these steps are intuitive and simple, the first step reveals the built-in bias of this method. If prevailing wages are greater than the alternative wage, this method automatically provides results indicating that the wage policy is associated with increased construction costs. Essentially, the first step is a ‘loaded question.’ With the wage differential method, it is not a question of *if* prevailing wages increase construction costs. The built-in approach asks “how much do prevailing wages increase costs?” The wage differential method does not allow for more appropriate questions such as: Is there a cost difference due to prevailing wages and if so, how large is this cost difference? Other methods such as those based on statistical analysis allow for these questions. The preponderance of studies based on statistical analysis find that construction costs are not affected by prevailing wages.⁵⁶ Consequently, it is very important to

⁵⁶ For a comprehensive review of the studies that examine the effect of prevailing wages on constructions costs, safety, training, and the racial composition of the construction labor force, see the companion study to this report----

ask if there is a prevailing wage cost effect before attempting to measure it. Because of the built-in bias, the wage differential method is inherently unscientific.

In addition to this fundamental issue, there are other problems associated with the first step. This step requires the selection of alternative “market” wage and benefit rates to compare to prevailing wages. The best measure of this alternative wage that is consistent with the logic of the wage differential method is the earnings of nonunion workers already performing the specific job in the area.⁵⁷ However, this information is very difficult to obtain as it is not publicly available. Researchers using the wage differential method have turned to publicly available data, but this information results in an inaccurate measurement of market alternatives to prevailing wages.

Many of the wage differential studies use data from the Occupational Employment Statistics (hereinafter, OES) from the Bureau of Labor Statistics as the ‘free market’ alternative to ‘regulated’ prevailing wage rates.⁵⁸ The OES provides average wage rates for over 800 occupations. The wage data are available for national, state, metropolitan, and nonmetropolitan areas.⁵⁹ While the OES data are appropriate for some uses, it is not suitable for use in measuring prevailing wage rates.⁶⁰ No less an authority than the Commissioner of the Bureau of Labor Statistics has testified before the House of Representatives that the OES data are not designed for

⁵⁷ The implication stated in several studies is that prevailing wages limit competition and protect union jobs and wages. Eliminating prevailing wages would result in more work for nonunion workers. See George Leef, “Prevailing Wage Laws: Public Interest or Special Interest Legislation?” *Cato Journal*, Vol. 30, No. 1, 2011, pp. 137-154.

⁵⁸ See the 2007 Mackinac study by Paul Kersey and the studies by the Beacon Hill Institute and the Center for Government Research as examples.

⁵⁹ See the Occupational Employment Statistics. Accessed at: <http://www.bls.gov/oes/>.

⁶⁰ In addition to providing wage and employment information for a large number of occupations, the OES data are used for labor force development planning and forecasting. See http://www.bls.gov/oes/oes_emp.htm#datause

prevailing wage determinations.⁶¹ If the OES wage data are not designed for prevailing wages, the use of these data as the market alternative to prevailing wages is questionable. The limitations of the OES for use as the market alternative to prevailing wages in the wage differential method are rooted in issues related to what data are collected, whom the data are collected from, and when the data are collected.

The national and state level OES data allow for wage comparisons for specific construction occupations in different sectors of the construction industry.⁶² For example, it is possible to gather wage information for power equipment operators employed in residential building construction or in highway, street, and bridge construction. A problem occurs when comparing county or regional level prevailing wages for detailed job classifications to state-wide OES average rates in the first step of the wage differential method. The state-wide average is not an accurate measurement of the local alternative market wage rate. Using these OES data would result in an inaccurate wage differential.

On the other hand, the metropolitan-level data measures wage differences between locations, but the OES data are not reported for different sectors of the industry.⁶³ This limitation means that the average wage data for a metro area is based on the earnings of all workers employed in all sectors for construction. Consequently, the average wage for a power equipment operator in a metro area is based on the earnings of these workers employed in residential building construction as well as highway, street, and bridge construction. However,

⁶¹ See “Statement of Erica Groshen, Commissioner, Bureau of Labor Statistics, U.S. Department of Labor Before the Subcommittee on Workforce Protections, Committee on Education and the Workforce, U.S. House of Representatives.” June 18, 2013. Accessed at:

⁶² See “Where can OES data be found” under “How to Get OES Data” at: “Frequently Asked Questions,” Occupational Employment Statistics. Accessed at: http://www.bls.gov/oes/oes_ques.htm#have.

⁶³ See “OES Research Estimates by State and Industry,” Occupational Employment Statistics. Accessed at: http://www.bls.gov/oes/current/oes_research_estimates.htm.

the skills, responsibilities, and compensation of power equipment operators involved in highway, street, and bridge construction are greater than comparable workers involved in residential construction.

For example, the operator of asphalt paving equipment used in highway resurfacing is responsible for millions of dollars of equipment and materials. This job requires continuous application of material over long distances with variable slopes while maintaining proper asphalt material thickness during application. Coordination with the operators of asphalt feeding and roller equipment is also required along with working with a large ground crew of laborers, insuring that the material is applied quickly while hot, and tolerating the risks and distractions of working on a busy highway.⁶⁴ The skills needed for this kind of work are at the upper end for the OES category for power equipment operators. On the other hand, the operator of an asphalt paver used in laying a residential driveway uses much smaller equipment, paves intermittently over a short distance, works with a small crew without the distractions and risks of passing traffic, and does not need to coordinate with other operators.⁶⁵ The skills, responsibilities, and compensation of the residential asphalt operator are lower than the corresponding highway worker.

When the wages of both of these workers are combined in the OES wage, the resulting average is not an accurate measure of more skilled workers because the earnings of lower skilled workers are included. As the example of power equipment operators illustrates, public works construction represents the upper end of the of the skill distribution for an occupation.

⁶⁴ For a visual description of this type of work see “Asphalt Paving Time-lapse Video” Accessed at: <https://www.youtube.com/watch?v=4tPwloIeNtM> . better; <https://www.youtube.com/watch?v=T0Y3RtY7tNo>

⁶⁵ For a video presentation of this type of work see “Paving a Driveway.” Accessed at: <https://www.youtube.com/watch?v=IrvSmv7JUE0>.

Consequently, the OES average wage for an occupation is not an accurate measure of the market alternative to prevailing wages for these workers. Using the OES wage will result in a wage difference between prevailing wages and the OES “market” wage that is too large.⁶⁶ This will result in a cost impact of prevailing wages that is inaccurate and too large.

Several other features of the OES contribute to average wages that do not reflect the earnings of relatively skilled workers. First, apprentice workers are classified with the appropriate skilled construction trade occupation.⁶⁷ A beginning apprentice typically works for 50% of the journeyworker wage and over three to five years, depending on the length of the apprenticeship, the apprentices’ wages rises to the journeyworkers’ wage. When the OES combines apprentices with more experienced journeyworkers, this pulls the average wage down from the wages paid to the relatively higher skilled workers employed on public projects.

The timing of the OES wage survey has the same effect. The OES semi-annual surveys take place in November and May.⁶⁸ November is off-peak in the construction industry while May is during the peak season. The November survey captures wage rates for career construction workers, while the May survey picks up the influence of marginal, less skilled employees on industry wage rates. Finally, because the sample size for the OES is small relative to the number of occupations, the Bureau of Labor Statistics is forced to use rolling three year averages to increase the numbers.⁶⁹ This can cause a time gap between OES data and prevailing

⁶⁶ The opposite is the case when comparing prevailing wages to OES averages for power equipment operators involved in residential construction. Since the OES average wage includes the earnings of more skilled workers, the OES wage may be greater than the alternative market wage.

⁶⁷ The OES uses the Standard Occupational Classification. Accessed at: <http://www.bls.gov/soc/home.htm>. In this classification system apprentices are classified with the appropriate skilled construction trade classification. See the description of helpers, laborers, and apprentices at: <http://www.bls.gov/soc/2010/soc473012.htm>.

⁶⁸ See “Overview,” Occupational Employment Statistics. Accessed at: http://www.bls.gov/oes/oes_emp.htm#scope.

⁶⁹ Ibid.

wages that may have more frequent surveys or are referenced to negotiated scheduled wage increases that are more up to date.

In sum, the OES data simply report broad occupational average wages. These data are not reflective of “free market” wage rates, nor should these data be considered alternatives to prevailing wages. The use of OES data in the wage differential method results in a wage gap between prevailing and alternative wages that is too large. Consequently, the wage differential method results in a cost impact of prevailing wage laws that is too high. These issues are more fully developed in the following section where the wage differential method is applied to measuring the cost impact of Davis-Bacon prevailing wages on the cost of highway resurfacing projects in Colorado.

The Wage Differential Method, the Davis-Bacon Act, and the Cost of Highway Resurfacing in Colorado

Asphalt resurfacing on federal highways typically involves the work of operators of power equipment, laborers, and truck drivers. While the tasks involved in resurfacing work are intuitive, the terminology is not. The typical resurfacing project requires the removal of existing asphalt material with a rotomiller, cleaning of debris with a power broom, and application of hot mix asphalt with paver, spreader, laydown, screed, and roller equipment. After the application of asphalt material, a motor grader smooths surface disruptions to the road shoulder or surrounding area. Power equipment oilers clean, inspect, lubricate, and make minor adjustments to equipment in the field. Laborers rake, shovel, and spread asphalt as well as control traffic. Truck drivers deliver power equipment in low boy trucks, haul used asphalt from the work site, and deliver new materials in dump trucks. A distributor truck hauls, heats, and sprays emulsified

asphalt on other projects requiring surface treatments such as chip seal applications. A pilot car guides traffic through the worksite.

Current Davis-Bacon prevailing wage rates for the detailed job classifications involved in asphalt resurfacing are reported in the second column of Table 1.⁷⁰ For demonstration purposes, prevailing wages for Denver and Douglas counties based on the January 2, 2015 wage decision are used. Colorado has a relatively low percent of private construction employment that is covered by collective bargaining agreements (8.3% in 2014).⁷¹ In the Denver metro area, 9.3% of private construction employment is covered by a union agreement. Consequently, it is not surprising that average rates prevail for all of the job classifications reported in Table 1 with exception of asphalt paver.⁷² Average wage rates from the OES are reported in the third column of Table 1 for the nearest corresponding occupational categories for the Denver-Aurora-Broomfield metropolitan area in May of 2014.⁷³

⁷⁰ See “Selected DBA Wage Decisions,” Wage Determinations OnLine.gov. Accessed at: <http://www.wdol.gov/dba.aspx>.

⁷¹ See “Union Membership and Coverage Database from the CPS,” Unionstats.com. Accessed at: <http://www.unionstats.com/>.

⁷² This is union wage rate for another classification and may be an administrative recording error. Data from local #9 suggests this is a union rate for another classification.

⁷³ See “Denver-Aurora-Broomfield,” May 2014 Metropolitan and Nonmetropolitan Area Occupational Employment and Wage Estimates, Occupational Employment Statistics. Accessed at: http://www.bls.gov/oes/current/oes_19740.htm#47-0000.

Table 1. Current Davis-Bacon Prevailing Wages and OES Average Wages, Highway Resurfacing Job Classifications, Denver and Douglas Counties, Colorado.

Job Description	D-B Wage	OES Wage
Power Equipment Operators		
Asphalt Laydown	\$22.67	\$19.11
Asphalt Paver	\$24.97	\$19.11
Asphalt Roller	\$23.13	\$19.11
Asphalt Spreader	\$22.67	\$19.11
Broom/Sweeper	\$22.47	\$21.64
Grader/Blade	\$22.67	\$21.64
Oiler	\$23.73	\$19.11
Rotomill	\$16.22	\$19.11
Asphalt Screed	\$22.67	\$19.11
Laborers		
Asphalt Raker	\$16.29	\$15.80
Asphalt Shoveler	\$21.21	\$15.80
Asphalt Spreader	\$18.58	\$15.80
Traffic Flagger	\$9.55	\$15.80
Traffic Other	\$12.43	\$15.80
Truck Drivers		
Distributor	\$17.81	\$11.14
Dump Truck	\$15.27	\$11.14
Lowboy Truck	\$17.25	\$11.14
Pilot Car	\$14.24	\$11.14
Average	\$19.10	\$16.70

Sources: Wage Determinations OnLine.gov and *Occupational Employment Statistics*, Bureau of Labor Statistics.

The first problem encountered with comparing the OES to Davis-Bacon wages is that the former does not contain as many detailed occupational categories. Even with over 800 different occupational categories, the OES is a poor match for the detailed job distinctions in the construction industry. Power equipment operators are divided into two categories in the OES

(paving, surfacing, and tamping equipment operators and other power equipment operators). Laborers are all grouped into one category (construction laborers) and “all other motor vehicle drivers” is the best match for the truck driving responsibilities involved in resurfacing work. Consequently, under the OES there are a total of four separate job categories and wage rates. On the other hand, the Davis-Bacon survey identifies 18 distinct jobs and 16 wage rates.⁷⁴ Rather than reflecting the free market alternative to Davis-Bacon rates, the OES is an average wage for broadly defined job categories.

As a broad average wage, the OES does not behave like a market wage and does not reflect the functions of a market wage. When jobs differ in terms of skills, responsibilities, and risk, market wages typically reflect these differences. This is evident when comparing OES and average Davis-Bacon wage rates in Table 1. With only two average wages in the paving, surfacing, and tamping equipment operator category, the OES does not reflect market differences between these workers. This average wage for operators of asphalt application equipment (pavers, laydown, spreaders, and screed devices) is the same as the hourly earnings of the rotomill operator (\$19.11). Asphalt applicators and power sweepers must coordinate with other power equipment operators while operating rotomill equipment emphasizes straight-ahead driving to maintain a true line.⁷⁵ On the other hand, average Davis-Bacon rates reflect differences in skills and responsibilities between these two jobs with operators of asphalt applicators earning more than \$22 per hour and rotomill operators earning slightly more than \$16 per hour.

⁷⁴ These differences in the number of detailed job classifications between Davis-Bacon wage determinations and the OEs is not limited to this application. The OES includes one category for electricians. Davis-Bacon wage determinations include distinctions for electricians working in heavy, highway, building, and residential construction with additional distinctions between these sectors. See Wage Determinations OnLine.gov. Ibid.

⁷⁵ See “Roto-Milling,” Sweeper World.com. Accessed at: <http://www.worldsweeper.com/Milling/v6n2RotoMilling.html>.

Laborers perform physically demanding work and have one of the highest injury rates.⁷⁶ The duties of this type of work vary on highway resurfacing work. Those who work with asphalt (shoveling, raking, and spreading) work with hot and heavy material. The wage data in Table 1 indicate that laborers performing these tasks earn more than laborers involved in traffic control. The average hourly wage for asphalt workers ranges from \$16.29 to \$21.21 while those in traffic control earn either \$9.55 or \$12.43. Traffic controllers either direct traffic around worksite (flaggers) or move cones and other equipment to separate the work site from traffic. A market wage will compensate workers for the demands of a job. The average Davis-Bacon wages reflect these differences. However, since there is only one category for all construction laborers in the OES, the average wage does not reflect differences in job requirements. In this sense the average Davis-Bacon rate acts more like a market wage than the OES.

The same applies to truck drivers. There is only one OES job classification that describes the types of vehicles involved in highway resurfacing with a wage of \$11.14. The OES average wage does not reflect the differences in compensation between the driver of a low boy truck that must haul the large and heavy equipment used in asphalt resurfacing to the work site, and the driver of the pilot car that guides traffic through the work site. Once again, the Davis-Bacon average rates do a better job of reflecting the differences in these two jobs by paying the low boy truck driver \$17.25 per hour and the pilot car driver \$14.24 per hour.

Since the OES averages do not capture differences between and within occupations, it is a 'blunt instrument' when used in the first step of the wage differential method. This results in a wage differential between specific prevailing wage job classifications and broad OES categories

⁷⁶ See "Construction Laborers and Helpers," Occupational Outlook Handbook, Bureau of Labor Statistics. Accessed at: <http://www.bls.gov/ooh/Construction-and-Extraction/Construction-laborers-and-helpers.htm>

that is very imprecise. This is another factor that contributes to an arbitrary cost estimate when the wage differential method is used.

The first step of the wage differential method implies that the wage rates compared to prevailing wages should be the hourly compensation of workers who would perform the work in the absence of the wage policy. Since the average Davis-Bacon rate prevails for almost all of the job classifications involved in highway resurfacing in Denver and Douglas Counties, it is possible to calculate the range of average wages of nonunion workers. The data for power equipment operators can be used to illustrate how the average rate paid by nonunion contractors can be calculated. For example, the prevailing average Davis-Bacon rate reported in Table 1 for an asphalt laydown operator is \$22.67. No more than 50% of this average consists of the corresponding union rate that is \$23.67.⁷⁷ If 50% of the prevailing rate is the union rate, the average reported rate by nonunion contractors is \$21.67. This is based on the following: 50% of the Davis-Bacon average prevailing wage consists of the union rate \$23.67 and 50% of the average rate paid by nonunion contractors in this area.⁷⁸ This can be expressed in the following algebraic equation:

$$\$22.67 = (50\% \times \$23.67) + (50\% \times X) \text{ [where X equals that average nonunion rate]}$$

$$\text{Solving for X} = \$21.67.^{79}$$

⁷⁷ Davis-Bacon average prevailing wage rates for Denver and Douglas Counties were surveyed and introduced in 2011. While prevailing wage rates based on union rates adjust with collective bargaining agreements, average rates are fixed until the next survey. Operating Engineers Local #9 supplied the master agreement for 2011 that provides corresponding union rates.

⁷⁸ The Davis-Bacon average prevailing wage is weighted by the total employed in the classification. It is not possible to replicate the weights. Consequently, this method provides an estimate of the average, unweighted nonunion wage.

⁷⁹ In this case the formula is: $\$22.67 = (1\% \times \$23.67) + (99\% \times X)$, where $X = \$22.66 =$ the average nonunion wage. The average wage earned by a nonunion asphalt laydown operator is at its minimum when the union wage represents 50% of the overall Davis-Bacon average wage. Union representation in the calculation of the average

This equation can also be used to calculate the average nonunion rate under the other extreme if the union rate only represents 1% of the average wage. In this case the nonunion average wage is \$22.66. Consequently, the range of nonunion wage rates can be estimated based on the range of representation of union rates in calculating the prevailing average rate.

These wage data are reported for seven of the power equipment operators in Table 2.⁸⁰ The second column in this table contains the same Davis-Bacon wage rates reported in Table 1. The third column contains the corresponding union rates. The fourth column lists the OES average data from Table 1. The fifth and sixth columns report the estimated nonunion average rates when union wages represent 50% and 1% of the average Davis-Bacon rate, respectively. The differences between Davis-Bacon rates, union and nonunion rates are about \$1.00 per hour. The exception is the rotomill classification where the union rate exceeds this prevailing rate by over \$7.00 per hour. The nonunion rate for this classification of \$8.62 per hour (when the union rate represents 50% of the prevailing average) is substantially lower than the prevailing average. This suggests that the representation of the union rate in calculating the prevailing wage was substantially lower than 50%, at least in this case.

prevailing wage may be zero if union wages were not submitted during the survey. In this case, the average nonunion wage is the prevailing wage (\$22.67). Based on wage determinations from the 2011 survey and the master agreement for Operating Engineers Local #9 for the same year. This is a state-wide agreement and reflects the union rates that would have been submitted to the survey.

⁸⁰ Asphalt pavers are omitted as the reported wage for this job classification is a union wage according to the master agreement of Operating Engineers Local #9.

Table 2. Davis-Bacon, OES, and Estimated Nonunion Average Wages, Highway Resurfacing Job Classifications, Denver and Douglas Counties, Colorado.

Job Classification	Davis-Bacon Wage	Union Wage Rate	OES AVERAGE WAGE	Nonunion Wage Rate ^a	Nonunion Wage Rate ^b
Asphalt Laydown	\$22.67	\$23.67	\$19.11	\$21.67	\$22.66
Asphalt Roller	\$23.13	\$23.67	\$19.11	\$22.59	\$23.12
Asphalt Spreader	\$22.67	\$23.67	\$19.11	\$21.67	\$22.66
Broom/Sweeper	\$22.47	\$23.67	\$21.64	\$21.27	\$22.46
Grader/Blade	\$22.67	\$23.67	\$21.64	\$21.67	\$22.66
Oiler	\$23.73	\$23.82	\$19.11	\$23.64	\$23.73
Rotomill	\$16.22	\$23.82	\$19.11	\$8.62	\$16.14
Asphalt Screed	\$22.67	\$23.67	\$19.11	\$21.67	\$22.66

^a Estimate of nonunion average wage when union wage is 50% of Davis-Bacon prevailing average wage.

^b Estimate of nonunion average wage when union wage is 1% of Davis-Bacon prevailing average wage.

Sources: Wage Determinations OnLine.gov and *Occupational Employment Statistics*, Bureau of Labor Statistics, Operating Engineers Local #9 of Colorado.

These data demonstrate that the OES averages are not accurate measures of market alternatives to prevailing rates. In most cases, either estimate of the nonunion average is greater than the corresponding OES rate. One of the exceptions is Broom/Sweeper operators where the OES average of \$21.64 exceeds the estimated nonunion average of \$21.27 when union rates represent 50% of the prevailing average. The other case is either estimate of the nonunion wage for rotomill operators (\$19.11 versus \$8.62 or \$16.11, respectively).

Using the OES data in the first step of the wage determination method will result in an artificially high measure of the wage gap when the OES average wage is less than the nonunion wage. For example, all Davis-Bacon rates exceed all OES rates by an average of approximately 16% (when the rotomill outlier is removed). On the other hand, Davis-Bacon rates for the same seven power equipment operators exceed the nonunion rates by only 4% (using the lower nonunion rates listed in the fifth column of Table 2). This illustration with a small number of occupations confirms a fatal flaw when using the OES in the wage differential method. Due to

the nature of the OES survey, these average wages do not reflect the skills and responsibilities of workers involved in public construction, nor do these averages represent alternative wages to prevailing rates. Using the OES data in the wage differential method results in a first-step wage difference that is too large. This leads to an overall cost effect of the prevailing wages in the second step of the method that is also too large. When the wage differential method is based on a wage difference that is too high, this approach promises a costs savings with the weakening or repeal of prevailing wage that cannot be kept.

These data for power equipment operators is too limited to fully illustrate the wage differential method. This approach is demonstrated with all of the job classifications used in highway construction in the following section.

Calculating the Difference between Prevailing Wages and “Market” Hourly Compensation

To complete the illustration of the first step of the wage differential method Davis-Bacon prevailing wage and fringe benefits are compared to OES wage rates and estimated fringe benefits (as the alternative to prevailing wages). Since the OES does not report benefit information it is necessary to turn to other sources. This illustrates another challenge of the wage differential method. There are no publicly available data that report fringe benefit information for union and nonunion construction workers. While average benefit rates paid to nonunion workers are the best measure of the alternatives under prevailing wages, these data are not publicly available. The only option is to use recent data from the Bureau of Labor Statistics indicating that fringe benefits, including retirement and insurance contributions, were 19.4% of

construction worker hourly pay in 2015.⁸¹ This figure applies to all construction workers from all segments of the industry, including union and nonunion workers. As a consequence, these data are an imperfect measure of benefits paid to nonunion workers on public construction. This imperfect option contributes to another inaccurate measurement of the differences in compensation between prevailing wages and the alternative market wage.

Total compensation with and without prevailing wages are reported in Table 3. The second and third columns report Davis-Bacon hourly wages and fringe benefits for the detailed job classifications involved in highway resurfacing. The sum of these two columns is reported in the fourth column. OES average wages are reported in fifth column with estimated benefits (19.4% of OES wages) reported in the sixth column. The measures of total compensation in the absence of prevailing wages are listed in the seventh column. The last column on the right hand side of Table 3 is the ratio of total compensation under Davis-Bacon to total compensation if OES wages and estimated benefits applied. These ratios indicate wide gaps between Davis-Bacon and the measure of an alternative market wage. For example, these data suggest that operators of asphalt laydown equipment earn 38% more per hour in terms of total compensation when working on Davis-Bacon projects. While some ratios indicate that Davis-Bacon rates are lower than the alternative (rotomill operators and traffic flaggers), most ratios are greater than one indicating total compensation is substantially higher under Davis-Bacon. This gap ranges as high as 78% for distributor truck drivers. The overall average of 28% suggests higher wage and

⁸¹ See Employer Costs for Employee Compensation – March 2015, News Release, Table 10, U.S. Bureau of Labor Statistics, U.S. Department of Labor. Accessed at: <http://www.bls.gov/news.release/pdf/ecec.pdf>.

benefits under Davis-Bacon compared to the alternative market wage.⁸² However, no confidence can be ascribed to this wage difference as it is based on the use of inaccurate data.

Table 3. Davis-Bacon and OES Wages, Benefits, and Total Compensation for Highway Resurfacing Occupations, Denver and Douglas Counties, Colorado.

Job Description	D-B Wage	D-B Benefits	D-B Total	OES Wage	Estimated Benefits	Total Without D-B	Ratio
Power Equipment Operators							
Asphalt Laydown	\$22.67	\$8.72	\$31.39	\$19.11	\$3.71	\$22.82	1.38
Asphalt Paver	\$24.97	\$6.13	\$31.10	\$19.11	\$3.71	\$22.82	1.36
Asphalt Roller	\$23.13	\$7.55	\$30.68	\$19.11	\$3.71	\$22.82	1.34
Asphalt Spreader	\$22.67	\$8.72	\$31.39	\$19.11	\$3.71	\$22.82	1.38
Broom/Sweeper	\$22.47	\$8.72	\$31.19	\$21.64	\$4.20	\$25.84	1.21
Grader/Blade^u	\$22.67	\$8.72	\$31.39	\$21.64	\$4.20	\$25.84	1.21
Oiler	\$23.73	\$8.41	\$32.14	\$19.11	\$3.71	\$22.82	1.41
Rotomill	\$16.22	\$4.41	\$20.63	\$19.11	\$3.71	\$22.82	0.90
Asphalt Screed	\$22.67	\$8.38	\$31.05	\$19.11	\$3.71	\$22.82	1.36
Laborers							
Asphalt Raker	\$16.29	\$4.25	\$20.54	\$15.80	\$3.07	\$18.87	1.09
Asphalt Shoveler	\$21.21	\$4.25	\$25.46	\$15.80	\$3.07	\$18.87	1.35
Asphalt Spreader	\$18.58	\$4.65	\$23.23	\$15.80	\$3.07	\$18.87	1.23
Traffic Flagger	\$9.55	\$3.05	\$12.60	\$15.80	\$3.07	\$18.87	0.67
Traffic Other	\$12.43	\$3.22	\$15.65	\$15.80	\$3.07	\$18.87	0.83
Truck Drivers							
Distributor	\$17.81	\$5.82	\$23.63	\$11.14	\$2.16	\$13.30	1.78
Dump Truck	\$15.27	\$5.27	\$20.54	\$11.14	\$2.16	\$13.30	1.54
Lowboy Truck	\$17.25	\$5.27	\$22.52	\$11.14	\$2.16	\$13.30	1.69
Pilot Car	\$14.24	\$3.77	\$18.01	\$11.14	\$2.16	\$13.30	1.35
Average	\$19.10	\$6.10	\$25.17	\$16.70	\$3.24	\$19.94	1.28

Sources: Wage Determinations OnLine.gov and *Occupational Employment Statistics*, Bureau of Labor Statistics.

⁸² This average is not weighted by the ratios in which the job classifications are combined and by differences in relative hours worked. The average assumes a ratio of one-to-one for all occupations.

Measurements of Total Construction Costs

The second step is to calculate the percentage of total construction costs that consists of labor costs. This issue is important as different studies use different measures of “total construction costs.” For example, the Center for Government Research uses labor costs (wages and benefits) and material costs as the measure of total costs with each representing 50% of total costs. The study by the Beacon Hill Institute also assumes that labor costs are 50% of total costs. There are two consequences of the allocation of costs used in these studies. First, in addition to material costs there are other contractor expenses such as the costs of fuels, energy, lubricants, rental equipment, administrative worker salaries, purchased services (subcontracted work), and contractor profit, etc. If some cost components are omitted, total construction costs are too low, and the measured prevailing wage cost effect will be larger. This is another way that the wage differential method promises a cost savings with the weakening or repeals of prevailing wage laws that cannot be kept.

Data from the Economic Census of Construction (ECC) provides the most reliable and comprehensive information on costs in the construction industry. To obtain this information 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.⁸³ The ECC reports data by geographic area, type of construction (residential, commercial, industrial, and highway, etc.), and for specialty trade contractors (plumbing, and electrical,

⁸³ 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.

etc.).⁸⁴ 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 over time. The survey is conducted every five years.⁸⁵ Data from the 2012 survey are the most recent available.

The ECC does not report labor costs as a percent of total costs. This ratio must be calculated based on other data. In this study, 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.⁸⁶ 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 net value of construction includes all building costs incurred by contractors, plus their profit. From the owner's

⁸⁴ 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>.

⁸⁵ 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#.

⁸⁶ The ECC defines construction worker payroll as 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.

perspective, the value of the project or its price represents all of the costs associated with building the project.

Data from the 2012 Economic Census of Construction indicates that labor costs for highway, street, and bridge construction is 25.5% of total construction costs. Based on this information and other information reported in Table 3, the two steps of the wage differential method can be illustrated:

Step 1: Based on an examination of prevailing wages for Denver and Douglas counties, Davis-Bacon prevailing wages increase total compensation for highway resurfacing in Colorado by 28%.

Step 2. Data from the ECC indicates that labor costs are 25.5% for highway, street, and bridge construction in Colorado. Consequently, Davis-Bacon wage requirements add 7.14% to the cost of highway resurfacing in this state ($28\% \times 25.5\%$). This estimate is consistent with the lower-end estimates reported in the wage differential studies described above (ranging from 7.5% for the Anderson study to 36% for the study by the Center for Government Research).

This estimate is based on cost data from the ECC. In this illustration, labor costs are 25.5% of the net value of highway, street, and bridge construction work (\$1,161,034,000). Cost estimates based on alternative definitions of total construction costs are illustrated below:

1. The studies by the Center for Government Research and the Beacon Hill Institute assume that labor material costs each represent 50% of total costs. Based on labor costs

equaling 50% of costs, the Davis-Bacon wage requirements add 14% to the cost of highway resurfacing in Colorado (28% x 50%).

2. According to data from the 2012 ECC, actual material costs for highway resurfacing in Colorado were \$481,403,000. Construction worker labor costs are \$296,536,000. The ratio of labor to material costs are 61.6%. If labor and material costs are the only costs to be considered, Davis-Bacon wage requirements add 17.1% to construction costs (28% x 61.6%).

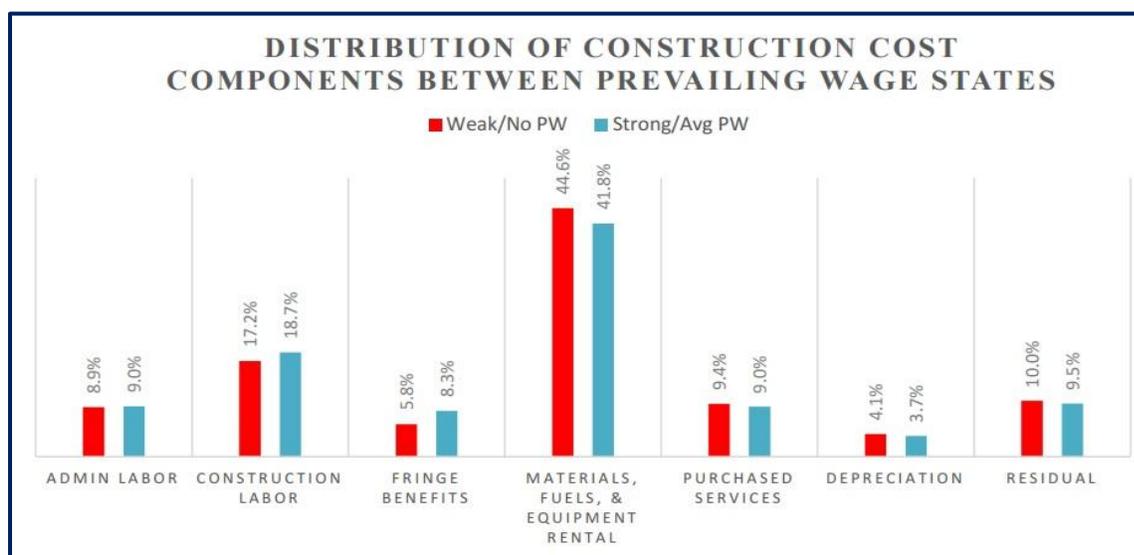
These examples illustrate how the estimated impact of prevailing wage on construction costs changes with the definition of costs. When costs are more comprehensively calculated, the effect of prevailing wages is low. When costs are more narrowly and incompletely defined, the cost estimate is larger. When studies like the Center for Government Research and the Beacon Hill Institute use incomplete measures of construction costs, the result is a prevailing wage cost effect that is misleadingly too high. The consequence of this practice contributes to a promised cost savings with the repeal or weakening of prevailing wages that cannot be kept.

Other Factors that Change with Wage Rates

When prevailing wage policy is introduced, weakened, or repealed, wage rates paid on public construction projects will change. In estimating the effect of a change in policy on construction costs, the wage differential method is entirely focused on the change in wage rates. However, numerous other cost components change in the construction industry when wages change. Some of these changes offset the cost increase associated with higher prevailing wage rates. These offsetting changes are ignored by the wage differential method and this limitation is another reason why this approach results in a cost estimate that is too high. Data from the 2012

ECC illustrate the relation between differences in wage rates and other construction costs. The construction cost categories displayed in Figure 1 are sorted by states with average/strong prevailing wage laws and states with weak/no wage policy.⁸⁷ There are 25 states in each group.

Figure 1: Distribution of Construction Cost Components, Strong/Average vs. Weak/No



Source: *Economic Census of Construction, 2012*

These data indicate that states with at least average prevailing wage policies have higher labor costs with wages and benefits combining to 27.0 % of total construction costs (18.7% wage costs, plus 8.3% in benefits). On the other hand, labor costs represent 23.0% of total costs in states with no, or below average wage policies (17.2 labor costs, plus 5.8% benefits). There are clear and expected differences between the two groups of states. Where wages are higher, material costs and profit rates are lower. In states with at least average wage policies, material, fuels, and rental equipment costs are lower by approximately three percentage points (41.8% in states with at least average strength policies, versus 44.6% in state with weak or no laws).

Higher wages are indicative of more productive construction workers and the use of these

⁸⁷ See Kevin Duncan, Alex Lantsberg, and Frank Manzo, “The Cost of Repealing Michigan’s Prevailing Wage Policy: Impacts on Total Construction Costs and Economic Activity,” June 17, 2015. Accessed at: <http://illinoisepi.org/countrysidenonprofit/wp-content/uploads/2014/06/The-Cost-of-Repealing-Michigans-PWL-FINAL.pdf>.

workers may be associated with more efficient, less costly construction with respect to materials and fuels expenditures. Or, with higher labor costs, contractors may seek efficiencies in other areas such as material and fuel costs to remain competitive. Where wages are higher, profit rates are lower (see the column labeled “Residual” in the right side of Figure 1). While the implied pre-tax residual earnings of the owners of contracting companies is 0.5% lower in states with average/strong prevailing wage laws, the lower margin along with lower material costs tend to offset the effect of higher labor costs. These differences illustrate a bias in the wage differential method. By focusing exclusively on labor costs, the wage differential method ignores changes in other cost components. By ignoring these other changes, this approach yields a cost estimate that is too high.

Academic studies have examined the ease with which more skilled workers replace less skilled workers when wage rates change in the construction industry. Professors Blankenau and Cassou find that when wages increase, more skilled workers can easily replace less skilled workers at construction job sites.⁸⁸ Professors Balistreri, McDaniel, and Wong find that when wages increase in the construction industry, more capital equipment is used instead of construction workers. Contractors make the switch to the use of more equipment in order to maintain costs when construction labor becomes more expensive. The ease with which equipment can replace labor is not as great as the replacement of skilled for unskilled labor, but

⁸⁸ Economists use the concept of the ‘elasticity of substitution. Professor Blankenau and Cassou report an elasticity of at least 9.0 for the construction industry indicating that when the wages of less skilled construction workers increases by 1%, the demand for more skilled workers increases by 9%, indicating that skilled workers easily replace less skilled workers when wages change in the construction industry. These authors distinguish between less and more skilled workers based on educational attainment. Less skilled workers are those with 12 or fewer years of education while more skilled workers possess 16 or more years of education. See William Blankenau and Steven Cassou, “Industry Differences in the Elasticity of Substitution and Rate of Biased Technological Change between Skilled and Unskilled Labor.” *Applied Economics*, 2011, Vol. 43, pp. 3129-3142.

this change still occurs when wages change.⁸⁹ Combining the results of these two studies indicates that when construction wages increase, for whatever reason, more productive workers are used along with more equipment. Once again, these types of changes are ignored when the wage differential method is used. But, these changes affect overall construction costs. When wages increase, labor productivity increases while the number of construction worker decreases. The wage differential method is based on the assumption that neither of these changes takes place. But, increased productivity and reductions in employment mitigate the effect of increased wage rates. While changes are taking place that reduce labor costs, the use of equipment and corresponding costs increase with an increase in wages. It is beyond the scope of the wage differential method to account for net effect of all of these changes.

Recognizing that a variety of cost components change (decrease and increase) with a change in wages indicates that the cost effect of prevailing wages should not be measured exclusively by the examination of wage rates and labor costs. Rather, it makes more sense to examine the effect of prevailing wage laws on all costs, or the total costs of construction. Recognizing this suggests different ways of measuring the cost effect. One very common method is to compare total costs of projects that are covered by prevailing wages to other projects that are not covered by the wage policy.

Like the wage differential method, this new approach is intuitive, but it is based on a more complete understanding of the construction industry. In comparing two types of projects with differing policy coverage, it is important to take into account other differences that

⁸⁹ The elasticity of substitution between capital and labor in the construction industry is small, indicating the difficulty in replacing workers with capital equipment. Both of the short and long-run elasticities are less than 1. See Edward Balistreri, Christine McDaniel and Eina Vivian Wong, "An Estimation of U.S. Industry-Level Capital-Labor Substitution Elasticities: Support for Cobb-Douglas." *The North American Journal of Economics and Finance*, 2003, Vol. 14, No. 3, 343-356.

contribute to costs. For example, highway resurfacing projects that are funded by the federal government require Davis-Bacon prevailing wages while these same projects that are funded by the State of Colorado are not affected by the policy. Federal projects may have higher costs compared to state-funded projects because of the wage requirements or because federal projects are larger and more complex. To measure any prevailing wage cost difference between these state and federal projects requires that other project differences that are unrelated to the wage policy be taken into consideration.

While this approach may also seem simple, implementing it is not. A comparison between two different types of projects can best be conducted with the statistical, curve-fitting method of regression analysis. This method allows for the comparison of two types of projects with differing policy coverage, taking into account other project differences that contribute to costs. With statistical analysis it is possible to determine if a measured result is likely to have occurred due to chance, or not. A 'statistically significant' result is unlikely to have occurred due to chance. If a result is not statistically significant, then the measured result is likely to have occurred due to chance. This technicality offers the possibility to ask first if there is a prevailing wage cost effect, followed by the second question regarding the size of the cost effect. For example, if a measured prevailing wage cost effect of 5% is not statistically significant, the measured effect is likely due to chance. This suggests that there is no relation between prevailing wages and construction costs. On the hand, and measured cost effect of 5% (that is statistically significant) indicates that the effect is not due to chance and that it is very likely that prevailing wages increase costs by 5%. Asking these types of questions is not an option with the wage differential method that is not capable of asking if a cost difference exists. This approach focuses exclusively on the size of the cost effect.

Professor Duncan has conducted three statistical studies addressing the effect of Davis-Bacon prevailing wages on the costs of highway resurfacing projects in Colorado. All of these studies are based on actual project cost data and not by the types of assumptions and estimates used in many wage differential studies. All of the statistical studies are based on highway resurfacing projects that were conducted in Colorado between 2000 and 2011. Data on these projects were obtained from the Colorado Department of Transportation (hereinafter, CDOT) project bid archives.⁹⁰ Project bid tabulations include information on the identity of all contractors who bid on these projects, the winning bid, all other bids, as well as information regarding the size, complexity, and other project characteristics. The winning bid is used as the measure of total construction costs in the statistical analysis.⁹¹

Two of these statistical studies have been published in peer-reviewed academic journals. The third study is in progress with the expectation that it will also undergo peer review. This type of review involves the evaluation of a study by one or more researchers with similar competence to those who produced the study. A peer review does not mean that the reviewers agree with the findings of the report. Rather, the purpose of the review is to insure quality, provide credibility, and maintain standards in the discipline. None of the wage differential studies discussed above have been peer-reviewed. There is a good reason for this. There are far too many errors in this approach to pass this type of review. Additionally, a peer-review would

⁹⁰ See “Archived Bid Tabulations,” Business Center, Colorado Department of Transportation. Accessed at: <https://www.codot.gov/business/bidding/Bid%20Tab%20Archives>.

⁹¹ Bid prices measure construction costs at the beginning of the project, but do not include add-on costs and change orders that increase the costs of the final project. Final project costs are not available from CDOT.

involve experts, who don't all agree on the effect of prevailing wages, but do agree that the wage differential method is inappropriate.⁹²

The first study examines cost differences between 64 resurfacing projects funded by federal government to 68 projects that were funded by the State of Colorado.⁹³ Federal projects require adherence to Davis-Bacon and Disadvantaged Business Enterprise regulations.⁹⁴ All other policies and quality standards apply equally to state and federal projects. Data for these projects indicate that on average, federal projects are approximately seventies more expensive than state projects. But, federal projects are also larger and more complex.⁹⁵ The results of the statistical analysis indicate that the cost difference between federal and state projects is not statistically significant once differences in project size and complexity are taken into consideration. Other results indicate that there is no statistically significant difference in the level of bid competition between state and federal projects. These results imply that federal

⁹² The wage differential method was commonly used in the 1980s, before the availability of more advanced statistical software. The last peer-reviewed study based on the wage differential method was published in 2001. See Edward Keller and William Hartman, "Prevailing Wage Rates: The Effects on School Construction Costs, Levels of Taxation, and State Reimbursements," *Journal of Education Finance*, 2001, Vol. 27, No. 2, pp. 713-728.

⁹³ Some researchers may claim that this sample size lacks 'statistical power.' This is not the case in this study and is fully addressed. See Duncan, Kevin. (2015) (a). "The Effect of Federal Davis-Bacon and Disadvantaged Business Enterprise Regulations on Highway Maintenance Costs." *Industrial and Labor Relations Review*, Vol. 68, No. 1, pp. 212-237. Accessed at: <http://ilr.sagepub.com/content/68/1.toc>.

⁹⁴ The Disadvantaged Business Enterprise (DBE) policy requires states to establish minimum participation rates for businesses owned and controlled by members of socially and economic disadvantage groups in federal construction. See "Overview," Disadvantage Business Enterprise (DBE) Program, U.S. Department of Transportation. Accessed at: <http://www.transportation.gov/osdbu/disadvantaged-business-enterprise>. The effect of this type of regulation on construction costs is controversial. De Silva, Dunne, Kosmopoulou, and Lamarche find that federal highway resurfacing projects in Texas with high DBE participation rates were no more expensive than projects with low rates. Research by Justin Marion indicates that with the repeal of the state-level disadvantaged business policy in California was associated with a 5.6% decrease in state-funded highway construction. See Dakshina De Silva, Timothy Dunne, Georgia Kosmopoulou, and Carlos Lamarche, 2012. "Disadvantaged Business Enterprise Goals and Procurement Contracting: An Analysis of Bidding Behavior and Costs." *International Journal of Industrial Organization*, Vol. 30, No. 4, pp. 377-388 and Justin Marion, Justin, 2009. "How Costly is Affirmative Action? Government Contracting and California's Proposition 209." *The Review of Economics and Statistics*, Vol. 91, No. 3, pp. 503-522.

⁹⁵ Differences in size are revealed by CDOT's engineer's estimate of project cost. Complexity is measured by the number of items or separate tasks that are listed in the engineer's estimate.

prevailing wage and disadvantaged business enterprise policies do not affect the relative cost, or level of bid competition on federal highway resurfacing construction in Colorado.

The second paper examines the effect of prevailing wages from a different perspective by comparing construction costs as the contractors switch from federal projects covered by Davis-Bacon and Disadvantaged Business Enterprise policies to state projects that are not covered by these policies.⁹⁶ This comparison is based on 91 projects completed by contractors that finished at least one state and one federal project between 2000 and 2011. Once again, federal projects in this sample of contractors are more expensive than state projects. But, once differences in project size and complexity are taken into account, there is no statistically significant difference in contractor costs as builders move between state and federal highway resurfacing projects.

While the two papers described above are unable to separate Davis-Bacon from Disadvantaged Business Enterprise policies, the third paper isolates the effect of the wage policy by taking advantage of a change in prevailing wages.⁹⁷ From at least the mid-1990s until April of 2002, union rates prevailed for all of the job classifications involved in highway resurfacing in Colorado. With the introduction of a new wage survey and determination in April of 2002, average rates prevailed for 85% of these occupations. This change represented an average decrease in total prevailing hourly compensation of 18% for the affected job classifications. In spite of this substantial change in wage and benefit costs for an overwhelming majority of jobs involved in highway resurfacing, the costs of federal projects relative to state funded projects did

⁹⁶ Duncan, Kevin, "Do Federal Davis-Bacon and Disadvantaged Business Enterprise Regulations Affect Aggressive Bidding? Evidence from Highway Procurement Auctions." Scheduled to appear in Issue 3, 2015 of the *Journal of Public Procurement*.

⁹⁷ See Kevin Duncan, "Do Construction Costs Decrease When Davis-Bacon Prevailing Wages Change from Union to Average Rates?" Working Paper, Colorado State University-Pueblo.

not change in terms of statistical significance with the decrease in wage rates. Additional results indicate that the level of bid competition also did not change in a statistically significant way with the change in wage rates.⁹⁸

The application of the wage differential method to an examination of the effect of Davis-Bacon prevailing wages on the cost of highway resurfacing projects in Colorado indicates that the wage policy added from 7% to 17% to total construction costs. The results of three statistical studies that examine these same projects fail to find a statistically significant prevailing wage cost effect. These statistical studies examine the impact of prevailing wages from several different perspectives and use different sample configurations. Any one statistical study may be flawed or have other limitations that incorrectly measure the prevailing wage cost effect. But, it is very unlikely that these types of errors would affect three studies that each addresses different aspects of prevailing wages. The examination of the cost effect from several perspectives provides a more comprehensive view of the impact of the policy. The results of this comprehensive analysis provide consistent results indicating that prevailing wages do not affect the level of project cost, or bid competition on highway resurfacing in Colorado. This comparison illustrates how the wage differential approach can report a cost effect of prevailing wages when statistical methods indicate there is no such effect.

Prevailing Wages and Construction Industry Employment

Several wage differential studies and other prevailing wage opponents assert that high prevailing wages reduce employer demand for construction workers and, by increasing costs and

⁹⁸ This study is based on an examination of 132 resurfacing projects.

reducing the number of projects, prevailing wages further reduce employment in the industry.⁹⁹ For example, the Mackinac study by Richard Vedder, Ph. D. reports that construction employment increased during the period when Michigan's prevailing wage law was suspended.¹⁰⁰ The law was suspended from December 1994 to June 1997 when annual growth in construction employment averaged over 17,000 jobs. This contrasts to the selected period before repeal (June 1992 to December 1994) when average growth in the industry was 4,000 jobs annually. Additionally, the study by the Citizens Housing & Planning Council implies that 25% higher construction costs due to prevailing wages would require either larger subsidies for low-income housing, renting to families with higher incomes, or cutting the number of housing units by 50%.¹⁰¹

The purported job loss due to prevailing wages can be illustrated using the data from the application of the wage differential method to highway resurfacing projects in Colorado. This application illustrated that the cost estimate depended on the definition of total construction costs and ranged from 7.14% to 17.1%. For example, a 7% increase in the cost of highway resurfacing projects represents approximately \$27 million of the \$386 million that the Colorado Department of Transportation received for the 2009 American Recovery and Reinvestment Act.¹⁰² This cost is equal to that of a large highway construction project that would employ

⁹⁹ See for examples, "ABC is Strongly Opposed to Job-Killing Prevailing Wage Requirements," Associated Builders and Contractors of Michigan. Accessed at: <http://www.abcmi.com/en-us/politicspolicy/issues/prevailingwage.aspx> and See "Editorial: Put an End to Prevailing Wage, Michigan Should Return to Market Rate Pay on Public Construction Projects to Save Money, Get More Work Done, Create Jobs." The Detroit News, May 20, 2015. Accessed at:

<http://www.detroitnews.com/story/opinion/editorials/2015/05/20/edit-end-prevailing-wage-michigan/27662653/>.

¹⁰⁰ See Richard Vedder, Ph. D. "Michigan's Prevailing Wage Law and Its Effects on Government Spending and Construction Employment." Ibid.

¹⁰¹ Elizabeth A. Roistacher, Ph. D., Jerilyn Perine and Harold Schultz, *Prevailing Wisdom: The Potential Impact of Prevailing Wages on Affordable Housing*, Citizens Housing & Planning Council, New York (December 2008). Ibid.

¹⁰² See "American Recovery & Reinvestment Act (ARRA)," Colorado Department of Transportation. Accessed at: <https://www.codot.gov/projects/arra/>.

about 105 construction workers.¹⁰³ A 17% increase in costs due to Davis-Bacon prevailing wages represents approximately \$66 million of total ARRA funds and suggests that federal wage requirements reduced construction employment by about 256 jobs.¹⁰⁴ On the other hand, the results of the three studies that examine the cost effect of Davis-Bacon regulations indicate that prevailing wages do not affect costs. If there is no cost effect, there is no decrease in employment or in the number of construction projects.

The claim that weakening or repealing prevailing wages and lower wage rates will increase construction employment is at odds with the empirical analysis of the economic impact of prevailing wage laws.¹⁰⁵ For example, a recent study by Smart Cities Prevail and the Midwest Economic Policy Institute found that repeal of Michigan's prevailing wage laws would reduce state-level economic activity by \$1.7 billion, reduce state-wide employment by over 11,000 jobs and reduce construction employment by over 4,000 jobs. While repeal would alter spending in the construction industry by reducing construction worker earnings and benefits, increasing materials and fuels costs, and contractor profits, the largest aspect of the impact is due to the increase in more construction completed by out-of-state contractors. Since states with

¹⁰³ This estimate of employment is based on data from the 2012 Economic Census of Construction. Specifically, the net value of construction for highway, bridge, and street construction (\$1,161,034,000) is divided by the number of construction workers (4,495) to obtain a measure of output per worker (\$258,295). The number of construction jobs needed to complete a \$27 million highway project is obtained by dividing \$27 million by output per worker.

¹⁰⁴ Using the same method and data from above, 17% of 386 million total ARRA funding equals \$66 million. Dividing by output per worker yields 256 jobs (\$66 million / 258,295 per worker equals 256 construction workers needed to produce \$66 million in highway construction in Colorado).

¹⁰⁵ Three recent studies have used data from the Economic Census of Construction, the American Community Survey, and other publicly available data to examine the economic impact of prevailing wage policies in California, Michigan, and Wisconsin. See "Building the Golden State," by Kevin Duncan and Alex Lantsberg, March 2015. 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, 2015. 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>.

weak or no prevailing wage laws have about 2% more construction work completed by contractors from other states, Michigan would expect to have at least \$670 million in additional construction completed by contractors from other states each year with prevailing wage repeal. The leakage of construction spending out of the state would ripple through the rest of Michigan's economy affecting all industries in the state. Rather than decreasing construction activity and employment, prevailing wages protect local contractors, construction workers, and economies by performing the basic function of protecting local wage rates.