Wages, Productivity and Highway Construction Costs

Updated Analysis
1994 – 2002

Prepared for

Construction Industry Labor-Management Trust

By

Construction Labor Research Council

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Introduction

Over the years there have been various pronouncements of the cost savings that would be realized if the Davis-Bacon Act was repealed. These assertions remain unsubstantiated. There is no documentation to support this position.

Little existed to back the proposition that wage rates and construction costs for highways have no direct correlation until the National Heavy and Highway Alliance, in 1995, commissioned an analysis of the costs to build a mile of highway. Data from the Federal Highway Administration (FHWA) was utilized to examine the relationship between wages, labor hours and highway construction costs. The conclusion was that hourly wage rates are a poor indicator of cost per mile to build highways. Lower wage states can have high total costs per mile and higher wage states can have lower total costs per mile.

To assure that the conclusions reached in 1995 remain valid, the National Heavy and Highway Alliance has updated the earlier study. Records for highways built from 1994 through 2002 have been reviewed and analyzed. The findings have been confirmed. When workers skills and productivity justify higher wage rates, highways can be built at the same, or even lower, cost per mile than when lower wage, lower skill workers are employed.

This study has been performed by the Construction Labor Research Council for the National Heavy and Highway Alliance.

Findings

Analysis of Federal Highway Administration data indicates that wages paid to construction workers are a poor indicator of the total cost per mile of a highway. In fact, among those states with the most expenditures for highways, cost per mile of highway was less among those states which pay higher hourly wages. This study updates and reconfirms the results of a similar review of highway expenditures published in 1995.

Cost data for all projects reported to the FHWA from 1994 through 2002 was reviewed. From the information for all states, a closer examination was made for those states with the greatest highway expenditures. This was done to eliminate any variability that might occur in lower construction dollar volume states.

High expenditure states were defined as those with reported highway spending of greater than $1 billion for the nine year period. There were 14 states that met this criteria. They represented 60 percent of the total construction dollars, 53 percent of total construction miles and 60 percent of total labor hours over the nine year period of the study. The following are the results of the comparisons for the project-per-mile averages:

	Low Wage	High Wage
Average Hourly Wage	$15.68	$26.34
Hours per Mile	10,276	6,991
Labor Costs Per Mile	$161,128	$184,138
Total Costs Per Mile	$857,965	$826,509

The dividing point for defining low and high wage states was an hourly wage rate of $25. Rates in low wage states ranged between about $12 and $25. The wage in the high wage states was about $25 to $30. (See Tables 1 and 2 for detailed data by state.)

The data shows that labor hours to complete a mile of highway are 32 percent lower in the high wage states in spite of a 69 percent higher wage rate. Total costs per mile between the low wage states and high wage states is 3 percent less in high wage states when compared to the 69 percent wage rate differential. The high wage states averaged an over $30,000 per mile savings to taxpayers.

Another logical point for identifying high expenditure states was $100 million dollars per year for the nine year period. This adds three states to the analysis. The conclusions remain unchanged. (See Tables 3 and 4)

	Low Wage	High Wage
Average Hourly Wage	$15.43	$26.63
Hours per mile	10,572	6,849
Labor Costs Per Mile	$163,120	$182,386
Total Cost Per Mile	$870,328	$836,139

While the hourly wage rate for the high wage states was 73 percent more than the low wage, labor hours were 35 percent less and total cost per mile was 4 percent less. Again, not only was hourly wage rate a poor predictor of total highway cost per mile, but there were cost per mile savings associated with construction in the average high wage state.

Statistics for all states are shown on Tables 5 and 6. Combining the states where the most dollars were spent is believed to be the most appropriate way of looking at a representative group of projects and eliminating the impact of specific projects in lower volume states.

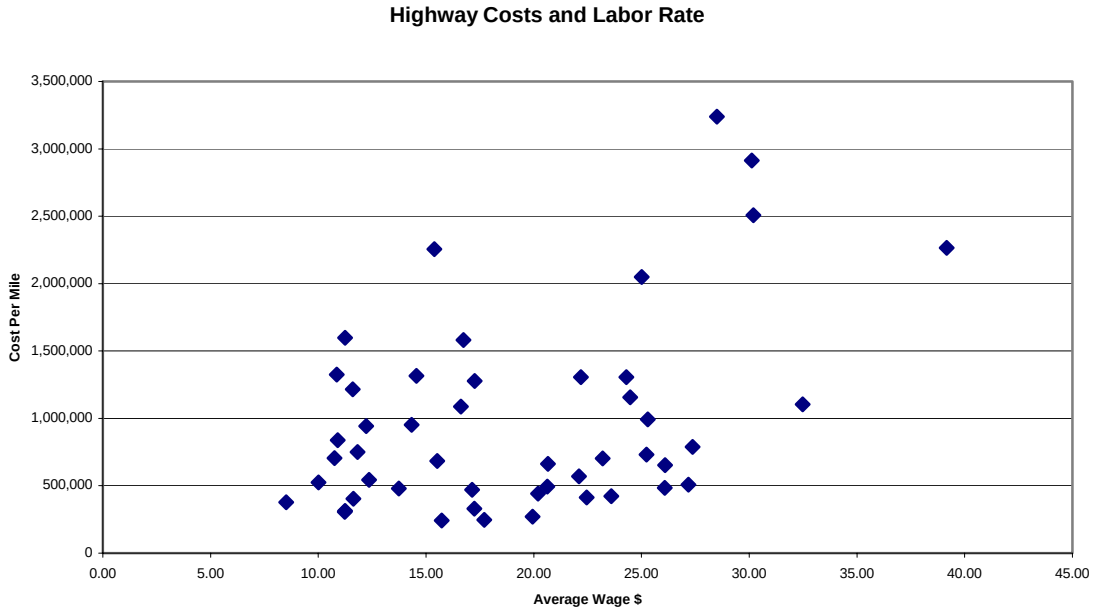
Higher wage workers can build highways with no impact upon total cost because of their superior skills. This is evidenced by their need to utilize one-third fewer labor hours. Workers benefit from a higher standard of living at no cost to taxpayers.

Another observation from reviewing the data is the small portion of highway cost which is attributable to labor. Only 20 percent of the total expenditures recorded by the FHWA are labor costs. Efforts to reduce federal highway expenditures are, therefore, likely to be better directed toward other cost categories which account for 80 percent of highway costs.

Conclusion

The conclusion of the 1995 study remains valid and is reprinted:

> “Simplistic views and pronouncements that proclaim lowering the hourly wage rates of construction workers will reduce construction costs and expenditures show a basic misunderstanding of the construction industry. As we have shown in this report, wage rates have a strong correlation with man-hours which should prove to anyone’s satisfaction that productivity is the key to calculating labor costs.
>
> Any attempt to reduce construction expenditures by reducing wage rates will be met with a corresponding decrease in productivity which could, in fact, produce an increase in construction costs.”



Excludes D.C., HI, PR

Average wage rate paid to construction workers in highway projects says little, if anything, about the total cost per mile of highway. The same wide range of total cost per mile exists for states with an average wage rate of $10 per hour as for states with an average wage rate of $25 per hour!

Those who advocate lower construction wage rates to reduce highway costs are not supported by the data. Reducing wages reduces worker skills/quality and has no impact upon total cost.

Table 1
Federal Highway Administration (FHWA)
Construction Statistics
Top 14 Dollar Value States
1994 - 2002

By Average Wage Rate

State	Wage Rate	Total Cost Per Mile	Labor Cost Per Mile	Man Hours Per Mile
Texas	11.82	749,484	116,973	9,893
Florida	12.22	941,743	187,248	15,326
Maryland	15.39	2,256,687	474,625	30,833
Iowa	17.13	469,916	85,961	5,018
Colorado	22.10	570,600	115,069	5,206
West Virginia	22.19	1,306,339	276,212	12,446
Pennsylvania	24.29	1,306,979	291,247	11,989
Indiana	24.47	1,155,822	265,128	10,835
Average	$15.68	$857,965	$161,128	10,276
Connecticut	$25.01	$2,048,670	$464,093	18,559
Missouri	25.22	730,918	146,200	5,796
Washington	26.08	484,292	118,309	4,537
Illinois	26.10	653,459	153,883	5,897
Michigan	27.37	787,477	159,013	5,811
New Jersey	30.19	2,506,508	555,135	18,387
Average	$26.34	$826,509	$184,138	6,991

Over $1 billion in total construction expenditures per year.

Table 2
Federal Highway Administration (FHWA)
Total Construction Statistics
Top 14 Dollar Value States
1994 - 2002

By Average Wage Rate

State	Construction Dollars	Roadway Miles	Bridge Miles	Construction Miles	Labor Hours	Gross Earnings Dollars	Cost Per Labor Hour Dollars
Texas	$7,796,997,501	10,218.002	185.142	10,403.144	102,919,862	$1,216,887,089	$11.82
Florida	1,702,107,252	1,781.181	26.220	1,807.401	27,700,492	338,432,348	12.22
Maryland	1,450,670,445	618.896	23.936	642.832	19,820,663	305,103,941	15.39
Iowa	1,245,365,637	2,640.318	9.872	2,650.190	13,297,402	227,813,907	17.13
Colorado	1,183,024,215	2,050.750	22.548	2,073.298	10,794,552	238,572,953	22.10
West Virginia	1,094,206,879	820.648	16.965	837.613	10,425,193	231,358,463	22.19
Pennsylvania	2,661,299,480	1,988.060	48.162	2,036.222	24,412,923	593,044,452	24.29
Indiana	1,599,974,694	1,349.061	35.213	1,384.274	14,998,913	367,009,818	24.47
Total	$18,733,646,103	21,466,916	368.058	21,834.974	224,370,000	$3,518,222,971	$15.68
Connecticut	$1,634,198,030	761.700	35.987	797.687	14,804,349	$370,201,725	$25.01
Missouri	1,778,975,541	2,358.057	75.835	2433.892	14,105,837	355,833,886	25.22
Washington	1,062,266,994	2,163.436	30.005	2193.441	9,952,151	259,503,396	26.08
Illniois	2,955,975,696	4,436.428	87.152	4523.58	26,674,460	696,100,720	26.10
Michigan	1,166,067,267	1,466.472	14.292	1480.764	8,604,408	235,460,256	27.37
New Jersey	1,266,661,305	482.827	22.522	505.349	9,291,640	280,536,793	30.19
Total	$9,864,144.833	11,668.920	265.793	11,934.713	83,432,845	$2,197,636,776	$26.34

Over $1 billion in construction expenditures per year.

Table 3
Federal Highway Administration (FHWA)
Construction Statistics
Top 17 Dollar Value States
1994 - 2002

By Average Wage Rate

State	Wage Rate	Total Cost Per Mile	Labor Cost Per Mile	Man Hours Per Mile
Louisiana	$11.60	$1,215,282	$218,696	18,848
Texas	11.82	749,484	116,973	9,893
Florida	12.22	941,743	187,248	15,326
Maryland	15.39	2,256,687	474,625	30,833
Iowa	17.13	469,916	85,961	5,018
Colorado	22.10	570,600	115,069	5,206
West Virginia	22.19	1,306,339	276,212	12,446
Pennsylvania	24.29	1,306,979	291,247	11,989
Indiana	24.47	1,155,822	265,128	10,835
Average	$15.43	$870,328	$163,120	10,572
Connecticut	$25.01	$2,048,670	$464,093	18,559
Missouri	25.22	730,918	146,200	5,796
Washington	26.08	484,292	118,309	4,537
Illinois	26.10	653,459	153,883	5,897
Oregon	27.18	508,775	109,558	4,031
Michigan	27.37	787,477	159,013	5,811
Massachusetts	30.12	2,913,489	508,242	16,871
New Jersey	30.19	2,506,508	555,135	18,387
Average	$26.63	$836,139	$182,386	6,849

Over $100 million in construction expenditures per year.

Table 4
Federal Highway Administration (FHWA)
Total Construction Statistics
Top 17 Dollar Value States
1994 - 2002

By Average Wage Rate

State	Construction Dollars	Roadway Miles	Bridge Miles	Construction Miles	Labor Hours	Gross Earnings Dollars	Cost Per Labor Hour Dollars
Louisiana	$950,999,239	748.229	34.305	782.534	14,749,013	$171,137,417	$11.60
Texas	7,796,997,501	10,218.002	185.142	10,403.144	102,919,862	1,216,887,089	11.82
Florida	1,702,107,252	1,781.181	26.220	1,807.401	27,700,492	338,432,348	12.22
Maryland	1,450,670,445	618.896	23.936	642.832	19,820,663	305,103,941	15.39
Iowa	1,245,365,637	2,640.318	9.872	2,650.190	13,297,402	227,813,907	17.13
Colorado	1,183,024,215	2,050.750	22.548	2,073.298	10,794,552	238,572,953	22.10
West Virginia	1,094,206,879	820.648	16.965	837.613	10,425,193	231,358,463	22.19
Pennsylvania	2,661,299,480	1,988.060	48.162	2,036.222	24,412,923	593,044,452	24.29
Indiana	1,599,974,694	1,349.061	35.213	1,384.274	14,998,913	367,009,818	24.47
Total	$19,684,645,342	22,215.145	402.363	22,618.000	3,689,360,388	$3,518,222,971	$15.43
Connecticut	$1,634,198,030	761.700	35.987	797.687	14,804,349	$370,201,725	$25.01
Missouri	1,778,975,541	2,358.057	75.835	2433.892	14,105,837	355,833,886	25.22
Washington	1,062,266,994	2,163.436	30.005	2193.441	9,952,151	259,503,396	26.08
Illniois	2,955,975,696	4,436.428	87.152	4523.58	26,674,460	696,100,720	26.10
Oregon	922,418,363	1,784.171	28.846	1813.017	7,307,951	198,630,329	27.18
Michigan	1,166,067,267	1,466.472	14.292	1480.764	8,604,408	235,460,256	27.37
Massachusetts	993,598,897	332.999	8.035	341.034	5,753,729	173,327,831	30.12
New Jersey	1,266,661,305	482.827	22.522	505.349	9,291,640	280,536,793	30.19
Total	$11,780,162,093	13,786.090	302.674	14,088.764	96,494,525	$2,569,594,936	$26.63

Over $100 million in construction expenditures per year.

Table 5
Federal Highway Administration (FHWA)
Average Construction Statistics
1994-2002
By State

State	Average Wage Rate	Average Cost Per Mile	Labor Cost Per Mile	Labor Hours Per Mile
AK	$38.31	$488,591	$112,326	2,932
AL	10.90	838,222	119,726	10,980
AR	14.56	1,315,838	224,720	15,439
AZ	20.19	441,091	88,492	4,383
CA	28.49	3,238,739	752,580	26,412
CO	22.10	570,600	115,069	5,206
CT	25.01	2,048,671	464,094	18,559
DC	18.19	6,975,652	1,487,903	81,788
DE	17.25	330,989	53,967	3,129
FL	12.22	941,743	187,248	15,326
GA	11.63	402,505	72,029	6,191
HI	28.05	7,411,562	1,649,456	58,800
IA	17.13	469,916	85,961	5,018
ID	22.45	412,593	76,743	3,418
IL	26.10	653,459	153,883	5,897
IN	24.47	1,155,822	265,128	10,835
KS	16.62	1,087,248	211,789	12,746
KY	17.26	1,276,881	258,062	14,953
LA	11.60	1,215,282	218,696	18,848
MA	30.12	2,913,489	508,242	16,871
MD	15.39	2,256,687	474,625	30,833
ME	11.24	313,056	55,471	4,936
MI	27.37	787,477	159,013	5,811
MN	20.62	492,933	103,222	5,005
MO	25.23	730,918	146,200	5,796
MS	10.01	524,071	74,588	7,448
MT	19.94	270,730	55,120	2,764
NC	10.86	1,325,502	215,304	19,828
ND	17.71	248,070	44,667	2,522
NE	15.53	683,629	118,120	7,608
NH	14.34	952,227	167,199	11,663
NJ	30.19	2,506,508	555,135	18,387
NM	12.35	544,577	87,057	7,049
NV	32.48	1,103,701	249,177	7,672
NY	39.16	2,265,404	779,314	19,899
OH	25.30	992,446	210,632	8,326
OK	10.76	705,158	110,888	10,308
OR	27.18	508,775	109,558	4,031
PA	24.29	1,306,979	291,247	11,989
PR	7.09	3,926,072	669,023	94,314
RI	20.65	662,104	119,366	5,780
SC	8.51	378,202	49,688	5,837
SD	15.73	242,213	36,925	2,348
TN	11.25	1,598,158	229,332	20,386
TX	11.82	749,485	116,973	9,893
UT	23.20	703,747	151,904	6,549
VA	16.73	1,581,271	327,990	19,603
VT	11.23	306,615	52,282	4,655
WA	26.08	484,292	118,309	4,537
WI	23.60	422,873	88,078	3,732
WV	22.19	1,306,339	276,212	12,446
WY	13.73	480,435	85,166	6,201
Average	$18.20	$746,381	$146,563	8,053

Table 6
Federal Highway Administration (FHWA)
Total Construction Statistics
1994-2002
By State

State	Construction Dollars	Roadway Miles	Bridge Miles	Total Construction Miles	Labor Hours	Gross Earnings Dollars	Cost Per Labor Hour Dollars
AK	$383,062,996	780.284	3.732	784.016	2,298,850	$88,065,522	$38.31
AL	501,987,824	588.009	10.863	598.872	6,575,387	71,700,815	10.90
AR	503,559,280	371.137	11.554	382.691	5,908,504	85,998,380	14.56
AZ	162,229,829	367.084	0.708	367.792	1,611,901	32,546,626	20.19
CA	244,819,517	60.917	14.674	75.591	1,996,512	56,888,305	28.49
CO	1,183,024,215	2,050.750	22.548	2073.298	10,794,552	238,572,953	22.10
CT	1,634,198,030	761.700	35.987	797.687	14,804,349	370,201,725	25.01
DC	131,330,599	11.185	7.642	18.827	1,539,822	28,012,759	18.19
DE	23,248,033	70.188	0.050	70.238	219,776	3,790,549	17.25
FL	1,702,107,252	1,781.181	26.220	1807.401	27,700,492	338,432,348	12.22
GA	837,986,747	2,065.240	16.687	2081.927	12,889,590	149,960,143	11.63
HI	581,014,617	70.190	8.203	78.393	4,609,510	129,305,778	28.05
IA	1,245,365,637	2,640.318	9.872	2650.19	13,297,402	227,813,907	17.13
ID	404,212,825	976.429	3.259	979.688	3,348,914	75,184,644	22.45
IL	2,955,975,696	4,436.428	87.152	4523.58	26,674,460	696,100,720	26.10
IN	1,599,974,694	1,349.061	35.213	1384.274	14,998,913	367,009,818	24.47
KS	726,026,388	648.831	18.934	667.765	8,511,398	141,424,970	16.62
KY	186,533,194	144.637	1.448	146.085	2,184,480	37,699,035	17.26
LA	950,999,239	748.229	34.305	782.534	14,749,013	171,137,417	11.60
MA	993,598,897	332.999	8.035	341.034	5,753,729	173,327,831	30.12
MD	1,450,670,445	618.896	23.936	642.832	19,820,663	305,103,941	15.39
ME	210,347,014	667.422	4.492	671.914	3,316,410	37,271,423	11.24
MI	1,166,067,267	1,466.472	14.292	1480.764	8,604,408	235,460,256	27.37
MN	788,426,215	1,586.617	12.842	1599.459	8,005,413	165,099,046	20.62
MO	1,778,975,541	2,358.057	75.835	2433.892	14,105,837	355,833,886	25.23
MS	885,644,546	1,671.195	18.736	1689.931	12,586,541	126,049,220	10.01
MT	578,690,309	2,131.468	6.053	2137.521	5,907,380	117,819,354	19.94
NC	792,899,325	585.158	13.030	598.188	11,860,922	128,792,457	10.86
ND	559,515,081	2,248.777	6.698	2255.475	5,689,302	100,744,506	17.71
NE	409,861,713	597.078	2.460	599.538	4,561,228	70,817,536	15.53
NH	269,590,771	276.722	6.394	283.116	3,302,073	47,336,644	14.34
NJ	1,266,661,305	482.827	22.522	505.349	9,291,640	280,536,793	30.19
NM	229,124,135	419.334	1.404	420.738	2,965,927	36,628,266	12.35
NV	747,512,668	666.901	10.377	677.278	5,196,318	168,761,890	32.48
NY	541,642,321	225.689	13.404	239.093	4,757,618	186,328,454	39.16
OH	835,415,502	816.774	25.000	841.774	7,008,877	177,304,924	25.30
OK	613,676,355	854.460	15.808	870.268	8,970,860	96,501,868	10.76
OR	922,418,363	1,784.171	28.846	1813.017	7,307,951	198,630,329	27.18
PA	2,661,299,480	1,988.060	48.162	2036.222	24,412,923	593,044,452	24.29
PR	14,051,411	3.579	0.000	3.579	337,551	2,394,432	7.09
RI	361,867,764	543.467	3.075	546.542	3,158,867	65,238,760	20.65
SC	48,760,463	127.117	1.810	128.927	752,602	6,406,112	8.51
SD	806,845,613	3,318.055	13.083	3331.138	7,821,730	123,001,229	15.73
TN	609,219,247	371.670	9.531	381.201	7,771,113	87,421,716	11.25
TX	7,796,997,501	10,218.002	185.142	10403.144	102,919,862	1,216,887,089	11.82
UT	747,871,964	1,056.637	6.063	1062.7	6,959,414	161,428,788	23.20
VA	510,706,413	318.877	4.095	322.972	6,331,187	105,931,473	16.73
VT	51,825,218	157.921	11.103	169.024	786,853	8,836,899	11.23
WA	1,062,266,994	2,163.436	30.005	2193.441	9,952,151	259,503,396	26.08
WI	666,845,923	1,568.245	8.698	1576.943	5,884,513	138,894,354	23.60
WV	1,094,206,879	820.648	16.965	837.613	10,425,193	231,358,463	22.19
WY	246,318,596	508.652	4.047	512.699	3,179,487	43,664,431	13.73
Total	47,677,477,851	62,877.181	1,000.994	63878.175	514,420,368	$936,2206,632	

About the Data

The information in this report has been extracted from data obtained from the Federal Highway Administration. Contractors performing work under Federally funded contracts awarded by competitive bidding with a final construction cost of roadways and bridges of $1 million or more are requested, through their states, to submit detailed compilations of their costs. The information on these construction submissions (FHWA-47) is the basis for this analysis.

The FHWA provided all data for projects submitted for the nine year period from 1994 to 2002. Information for over 8,000 projects was received. This was edited to 7,506 projects believed to have provided valid, reasonable cost data.

Review of the data revealed situations in which states are not cooperating with the FHWA in collecting data from contractors. Data from a number of states appear to be incomplete. For each year of data, there were a few states for which there was not information. The only situation of significance is the low reporting for California. This is not believed to have effected the overall conclusions of this report.

Highway cost data are collected by FHWA to evaluate trends in construction costs and compare state highway construction costs. With the data, FHWA monitors federal construction spending and, partially, projects upcoming federal highway funding needs. The data are ideal for comparing labor costs because they are totally neutral as to contractor labor policy and philosophy.