A Comparison of Highway Construction Costs in the Midwest and Nationally

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A Higher Road for a Better Tomorrow
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INTRODUCTION

State Departments of Transportation play a significant role in the construction and maintenance of the country's roadway system. Each state employs its own approach and objectives when planning and constructing highway infrastructure, including addressing obstacles and environments unique to that state. This report analyzes the highway construction, right-of-way (ROW) acquisition, and preliminary and construction engineering costs for each state and more closely examines costs throughout the Midwest.

COMPARING COSTS BY STATE

Figure 1 (following page) summarizes each state's highway construction, ROW acquisition, and engineering costs per lane mile. This analysis provides an illustration of how construction costs compare between states; however, as stated above, each state encounters its own unique complications that factor into overall costs. Therefore, it cannot be exclusively used as a definition of cost effectiveness.

Expenditures Per Lane Mile

A cost per lane mile measure is used as the basis for the comparison between states. It is important to note that this does not provide the cost to build a newly constructed lane in a state for that year, it simply averages the total construction, ROW, and engineering costs for state administered roadways, respectively, expended each year between 1993 and 2015 by the total number of state administered lane miles that exist in the state during each year. In essence, it provides a normalization of the data to facilitate a comparison. While total highway construction, ROW, and engineering costs will fluctuate from year-to-year for each state depending on the number of projects completed and the management of project timelines, averaging the costs addresses outlying years.

Context for Construction Cost Comparisons

While this analysis allows for a comparison between states, a number of variables that impact highway project costs should also be taken into account. A state's geography, population density, and design requirements all impact construction costs (U.S. GAO, 2003; Philips, 2015). For example, projects in mountainous areas will be more complicated and costly than those in flat regions (U.S. GAO, 2003). A state with higher overall population density and more urban areas will have higher overall costs due to more stringent design standards on urban roadways, added complicated intersections such as expansive overpasses, and complex work zones during construction (Philips, 2015). Furthermore, material availability and costs and fuel prices can factor into higher construction costs (Washington State CRAB).

Consequently, while cost comparisons by state do provide a general representation of states that pay more, these variables should at least temper the perception of the states with the highest expenditures. Figure 2 compares each state's population density, percent of urban lane miles, and number of bridges per lane mile. Of the 15 states that fall above the national average for construction costs per lane mile, 13 also fall above the national average for population density. Furthermore, 20 of the states with less than average construction costs also fall significantly below the national average for population density, with 12 having 50 percent less density than the national average. To put it into perspective, the population density of the highest cost states, New Jersey and Massachusetts, ranking 1 and 2, are 1268 and 860 percent greater than the national average, respectively.

Figure 1: Average Annual Highway Construction, Right-of-Way (ROW), and Engineering Costs Over Time (1993-2015) Per Lane Mile

State	Construction Costs Per Lane Mile (2015 Dollars)*	Rank	ROW Acquisition Costs Per Lane Mile (2015 Dollars)*	Rank	Engineering Costs Per Lane Mile (2015 Dollars)*	Rank	Distribution of Total Costs		
							Construction	ROW	Engineering
New Jersey	$200,211	1	$18,846	1	$25,046	2	82%	8%	10%
Massachusetts	$145,029	2	$4,980	7	$37,171	1	77%	3%	20%
Hawaii	$76,038	3	$16,606	2	$14,200	8	71%	16%	13%
Florida	$67,349	4	$13,986	3	$20,594	3	66%	14%	20%
New York	$65,712	5	$1,999	24	$13,630	9	81%	2%	17%
Washington	$63,485	6	$5,148	6	$19,109	5	72%	6%	22%
Connecticut	$60,808	7	$3,070	15	$15,157	7	77%	4%	19%
Rhode Island	$60,168	8	$3,285	14	$20,025	4	72%	4%	24%
California	$59,257	9	$6,811	4	$16,617	6	72%	8%	20%
Maryland	$57,957	10	$4,651	8	$10,483	10	79%	6%	14%
Illinois	$51,907	11	$1,971	25	$8,294	12	83%	3%	13%
Arizona	$48,561	12	$3,376	13	$4,708	22	86%	6%	8%
Michigan	$42,887	13	$1,802	28	$2,714	37	90%	4%	6%
Indiana	$39,977	14	$2,419	21	$2,787	36	88%	5%	6%
Utah	$37,368	15	$5,512	5	$4,776	21	78%	12%	10%
Ohio	$31,571	16	$1,728	30	$5,120	19	82%	4%	13%
Wisconsin	$30,566	17	$2,894	18	$5,498	17	79%	7%	14%
Alaska	$29,909	18	$2,004	23	$8,387	11	74%	5%	21%
Alabama	$29,788	19	$1,547	34	$1,926	44	90%	5%	6%
Pennsylvania	$29,415	20	$1,591	33	$3,757	26	85%	5%	11%
Kansas	$29,119	21	$1,335	37	$3,666	27	85%	4%	11%
Colorado	$28,941	22	$1,643	32	$5,081	20	81%	5%	14%
Nevada	$28,374	23	$3,834	9	$7,700	13	71%	10%	19%
Louisiana	$26,634	24	$1,935	26	$3,200	31	84%	6%	10%
Iowa	$26,436	25	$1,684	31	$3,977	25	82%	5%	12%
Oregon	$26,395	26	$1,825	27	$5,888	15	77%	5%	17%
Georgia	$25,538	27	$3,566	10	$3,133	32	79%	11%	10%
Texas	$25,533	28	$2,335	22	$3,427	28	82%	7%	11%
Oklahoma	$24,356	29	$2,900	17	$1,863	45	84%	10%	6%
Minnesota	$24,190	30	$2,561	19	$4,367	24	78%	8%	14%
Delaware	$23,535	31	$3,003	16	$6,178	14	72%	9%	19%
Vermont	$22,473	32	$1,001	41	$2,923	33	85%	4%	11%
Mississippi	$22,174	33	$3,463	12	$3,323	30	77%	12%	11%
Idaho	$22,160	34	$1,348	36	$5,184	18	77%	5%	18%
Tennessee	$21,458	35	$3,478	11	$5,587	16	70%	11%	18%
New Hampshire	$20,879	36	$2,559	20	$4,647	23	74%	9%	17%
Arkansas	$18,282	37	$846	42	$2,034	43	86%	4%	10%
North Dakota	$17,922	38	$394	49	$2,082	41	88%	2%	10%
Wyoming	$17,428	39	$282	50	$3,368	29	83%	1%	16%
Nebraska	$16,916	40	$662	46	$2,432	38	85%	3%	12%
South Dakota	$16,707	41	$719	44	$1,815	47	87%	4%	9%
Kentucky	$16,609	42	$1,126	39	$2,134	39	84%	6%	11%
New Mexico	$15,578	43	$454	48	$1,592	49	88%	3%	9%
Montana	$15,217	44	$1,034	40	$2,829	35	80%	5%	15%
Maine	$15,071	45	$716	45	$2,865	34	81%	4%	15%
Missouri	$13,899	46	$1,218	38	$2,129	40	81%	7%	12%
North Carolina	$9,245	47	$1,739	29	$1,716	48	73%	14%	13%
West Virginia	$9,170	48	$755	43	$1,833	46	78%	6%	16%
Virginia	$8,585	49	$1,362	35	$2,078	42	71%	11%	17%
South Carolina	$6,867	50	$495	47	$1,334	50	79%	6%	15%
National Average	$36,473		$3,090		$6,808		79%	7%	14%

* Cost Per Lane Mile calculated by dividing annual construction, right-of-way acquisition, and preliminary and construction engineering costs for state highway agency adminstered roadways (FHWA Table SF-4C), respectively, by total state highway agency administered lane miles (FHWA Table HM-81) for each state for every year between 1993 and 2015; values were then averaged to determine the final cost per lane mile. Annual construction costs were converted to 2015 dollars using Bureau of Labor Statistics CPI-U prior to the calculation.

Figure 2: Highway Construction Costs Per Lane Mile Compared to Population Density, Urban Lane Miles, and Infrastructure

State	Highway Construction Costs (2015 Dollars)		Population Density (2010)		State Owned Urban Lane Miles (2015)		State Owned Infrastructure (2015)	
	Cost Per Lane Mile*	Rank	Population Per Square Mile	% Difference from National Average	% Urban	% Difference from National Average	Number of Bridges Per Lane Mile	% Difference from National Average
New Jersey	$200,211	1	1,196	1268%	89%	219%	0.28	84%
Massachusetts	$145,029	2	839	860%	86%	207%	0.37	146%
Hawaii	$76,038	3	212	142%	61%	118%	0.29	92%
Florida	$67,349	4	351	301%	64%	129%	0.13	-17%
New York	$65,712	5	411	370%	45%	59%	0.20	29%
Washington	$63,485	6	101	16%	32%	15%	0.18	18%
Connecticut	$60,808	7	738	745%	74%	166%	0.29	88%
Rhode Island	$60,168	8	1,018	1065%	71%	152%	0.21	36%
California	$59,257	9	239	174%	48%	73%	0.24	58%
Maryland	$57,957	10	595	581%	59%	109%	0.17	14%
Illinois	$51,907	11	231	164%	43%	54%	0.19	22%
Arizona	$48,561	12	56	-36%	28%	-1%	0.24	60%
Michigan	$42,887	13	175	100%	41%	48%	0.16	7%
Indiana	$39,977	14	181	107%	28%	0%	0.20	30%
Utah	$37,368	15	34	-62%	30%	8%	0.11	-26%
National Average	$36,473		87	0%	28%	-	0.15	0%
Ohio	$31,571	16	282	223%	38%	37%	0.21	39%
Wisconsin	$30,566	17	105	20%	26%	-9%	0.18	17%
Alaska	$29,909	18	1	-99%	14%	-48%	0.07	-54%
Alabama	$29,788	19	94	8%	31%	10%	0.19	28%
Pennsylvania	$29,415	20	284	225%	32%	13%	0.17	13%
Kansas	$29,119	21	35	-60%	12%	-56%	0.21	39%
Colorado	$28,941	22	49	-45%	25%	-10%	0.15	-1%
Nevada	$28,374	23	25	-72%	21%	-24%	0.08	-48%
Louisiana	$26,634	24	105	20%	27%	-2%	0.20	31%
Iowa	$26,436	25	55	-38%	17%	-41%	0.18	19%
Oregon	$26,395	26	40	-54%	22%	-23%	0.15	-3%
Georgia	$25,538	27	168	93%	38%	37%	0.14	-10%
Texas	$25,533	28	96	10%	26%	-6%	0.18	16%
Oklahoma	$24,356	29	55	-37%	18%	-37%	0.22	47%
Minnesota	$24,190	30	67	-24%	20%	-29%	0.13	-17%
Delaware	$23,535	31	461	427%	50%	78%	0.07	-53%
Vermont	$22,473	32	68	-22%	11%	-59%	0.18	20%
Mississippi	$22,174	33	63	-28%	17%	-39%	0.21	36%
Idaho	$22,160	34	19	-78%	11%	-59%	0.11	-29%
Tennessee	$21,458	35	154	76%	36%	29%	0.22	47%
New Hampshire	$20,879	36	147	68%	20%	-28%	0.15	2%
Arkansas	$18,282	37	56	-36%	19%	-33%	0.19	28%
North Dakota	$17,922	38	10	-89%	5%	-84%	0.07	-57%
Wyoming	$17,428	39	6	-93%	9%	-68%	0.12	-18%
Nebraska	$16,916	40	24	-73%	8%	-72%	0.16	3%
South Dakota	$16,707	41	11	-88%	5%	-81%	0.10	-34%
Kentucky	$16,609	42	110	26%	15%	-48%	0.15	-4%
New Mexico	$15,578	43	17	-81%	11%	-60%	0.10	-33%
Montana	$15,217	44	7	-92%	6%	-78%	0.10	-35%
Maine	$15,071	45	43	-51%	13%	-55%	0.11	-25%
Missouri	$13,899	46	87	0%	14%	-51%	0.14	-10%
North Carolina	$9,245	47	196	124%	29%	2%	0.10	-35%
West Virginia	$9,170	48	77	-12%	14%	-50%	0.10	-36%
Virginia	$8,585	49	203	132%	26%	-5%	0.09	-38%
South Carolina	$6,867	50	154	76%	31%	9%	0.09	-38%

* Cost Per Lane Mile calculated by dividing annual construction costs for state highway agency adminstered roadways (FHWA Table SF-4C) by total state highway agency administered lane miles (FHWA Table HM-81) for each state for every year between 1993 and 2015; values were then averaged to determine the final cost per lane mile. Annual construction costs were converted to 2015 dollars using Bureau of Labor Statistics CPI-U prior to the calculation.

Sources: U.S. Census Bureau (Population Density); Federal Highway Administration (FHWA), Highway Statistics Table HM-81 (Urban Lane Miles); FHWA National Bridge Inventory (Infrastructure)

Figure 3: Construction Costs Per Lane Mile and Hourly Wages

State	Highway Construction Costs (2015 Dollars)				Hourly Wages (2015)^			
	Cost Per Lane Mile*	Rank	Cost Per Construction Worker Hour**	Difference from National Average	Operating Engineers	Difference from National Average	Highway Maintenance Workers	Difference from National Average
New Jersey	$200,211	1	$134	$28	$32.09	$8.48	$25.61	$7.25
Massachusetts	$145,029	2	$187	$82	$31.43	$7.82	$22.87	$4.51
Hawaii	$76,038	3	$136	$30	$34.10	$10.49	U	-
Florida	$67,349	4	$103	-$2	$17.46	-$6.15	$15.62	-$2.74
New York	$65,712	5	$127	$22	$34.91	$11.30	$20.50	$2.14
Washington	$63,485	6	$110	$5	$28.28	$4.67	$22.86	$4.50
Connecticut	$60,808	7	$170	$64	$30.49	$6.88	$25.16	$6.80
Rhode Island	$60,168	8	$153	$48	$24.65	$1.04	$20.36	$2.00
California	$59,257	9	$104	-$2	$31.70	$8.09	$24.51	$6.15
Maryland	$57,957	10	$86	-$19	$22.67	-$0.94	$18.24	-$0.12
Illinois	$51,907	11	$159	$54	$34.40	$10.79	$21.46	$3.10
Arizona	$48,561	12	$102	-$3	$21.18	-$2.43	$18.02	-$0.34
Michigan	$42,887	13	$178	$73	$22.72	-$0.89	$19.62	$1.26
Indiana	$39,977	14	$118	$13	$25.49	$1.88	$16.40	-$1.96
Utah	$37,368	15	$119	$14	$21.48	-$2.13	$18.05	-$0.31
National Average	$36,473		$105	-	$23.61	-	$18.36	-
Ohio	$31,571	16	$106	$1	$25.34	$1.73	$18.28	-$0.08
Wisconsin	$30,566	17	$130	$24	$26.83	$3.22	$19.56	$1.20
Alaska	$29,909	18	$117	$11	$32.34	$8.73	$25.71	$7.35
Alabama	$29,788	19	$106	$1	$17.96	-$5.65	$13.86	-$4.50
Pennsylvania	$29,415	20	$113	$8	$22.98	-$0.63	$18.80	$0.44
Kansas	$29,119	21	$89	-$16	$19.17	-$4.44	$14.62	-$3.74
Colorado	$28,941	22	$73	-$33	$21.82	-$1.79	$20.18	$1.82
Nevada	$28,374	23	$88	-$17	$27.88	$4.27	$21.05	$2.69
Louisiana	$26,634	24	$81	-$24	$19.40	-$4.21	$13.65	-$4.71
Iowa	$26,436	25	$69	-$37	$22.45	-$1.16	$20.53	$2.17
Oregon	$26,395	26	$117	$11	$24.96	$1.35	$21.37	$3.01
Georgia	$25,538	27	$67	-$38	$16.79	-$6.82	$13.45	-$4.91
Texas	$25,533	28	$89	-$17	$19.01	-$4.60	$16.03	-$2.33
Oklahoma	$24,356	29	$99	-$6	$18.61	-$5.00	$15.00	-$3.36
Minnesota	$24,190	30	$50	-$55	$27.60	$3.99	$21.70	$3.34
Delaware	$23,535	31	$197	$92	$20.61	-$3.00	$16.68	-$1.68
Vermont	$22,473	32	$232	$126	$19.69	-$3.92	$19.20	$0.84
Mississippi	$22,174	33	$89	-$16	$18.05	-$5.56	$13.42	-$4.94
Idaho	$22,160	34	$130	$25	$20.28	-$3.33	$17.26	-$1.10
Tennessee	$21,458	35	$71	-$34	$19.12	-$4.49	$13.65	-$4.71
New Hampshire	$20,879	36	$78	-$27	$21.44	-$2.17	$17.13	-$1.23
Arkansas	$18,282	37	$210	$105	$16.86	-$6.75	$13.60	-$4.76
North Dakota	$17,922	38	$73	-$32	$26.37	$2.76	$21.62	$3.26
Wyoming	$17,428	39	$139	$33	$26.47	$2.86	$19.30	$0.94
Nebraska	$16,916	40	$96	-$10	$18.93	-$4.68	$16.33	-$2.03
South Dakota	$16,707	41	$165	$59	$19.25	-$4.36	$15.01	-$3.35
Kentucky	$16,609	42	$193	$87	$20.82	-$2.79	$14.81	-$3.55
New Mexico	$15,578	43	$114	$9	$20.93	-$2.68	$15.82	-$2.54
Montana	$15,217	44	$126	$21	$22.66	-$0.95	$20.30	$1.94
Maine	$15,071	45	$146	$40	$17.70	-$5.91	$15.98	-$2.38
Missouri	$13,899	46	$139	$34	$25.46	$1.85	$16.09	-$2.27
North Carolina	$9,245	47	$93	-$12	$17.29	-$6.32	$14.99	-$3.37
West Virginia	$9,170	48	$319	$214	$23.24	-$0.37	$12.53	-$5.83
Virginia	$8,585	49	$62	-$44	$19.25	-$4.36	$17.28	-$1.08
South Carolina	$6,867	50	$129	$24	$17.22	-$6.39	$13.55	-$4.81

U - Data Unavailable

* Cost Per Lane Mile calculated by dividing annual construction for state highway agency adminstered roadways (FHWA Table SF-4C) by total state highway agency administered lane miles (FHWA Table HM-81) for each state for every year between 1993 and 2015; values were then averaged to determine the final cost per lane mile. Annual construction costs were converted to 2015 dollars using Bureau of Labor Statistics CPI-U prior to the calculation.

** Cost Per Construction Worker Hour calculated by dividing the average annual highway construction costs (FHWA Table S4-4C) in 2015 dollars for each state between 1993 and 2015 by the total construction workers annual hours reported in 2012 for NAICS 237310: Highway, Street, and Bridge Construction (U.S. Census Bureau Economic Census).

^ Hourly Wages are mean wages for 2015 from the Bureau of Labor Statistics.

Similarly, 13 of the 15 highest construction cost states also fall significantly above the national average for the percent of lane miles in urban areas. Most notably, New Jersey has 219 percent and Massachusetts has 207 percent more urban lane miles than the national average. Again, the lowest cost states, in this case the 27 of the 35 that fall below the national average for construction costs, also fall below the national average for percent of urban lane miles, further indicating that population density and urban construction result in higher construction costs.

Lastly, all but two of the 15 states that have above average construction costs also have a higher number of bridges per lane mile. Specifically, Massachusetts has 0.37 bridges per lane mile (on state administered roadways), compared to only 0.15 bridges per lane mile nationally; this is more than 146 percent of the national average. Conversely, 20 of the 35 states that fall below the national average for construction costs also have lower number of bridges per lane mile.

Distribution of Total Costs

The distribution of total project costs between construction, ROW acquisition, and preliminary and construction engineering are also shown in Figure 1. Similar to construction costs, states with higher population densities (and higher construction costs) spend a larger percentage of the project budget on ROW acquisition and engineering costs. However, it is interesting to see that states that rank among the highest construction costs per lane mile do not consistently rank among the highest ROW and engineering costs per lane mile; for example, New York ranked fifth for construction costs, yet is 24th and 9th for ROW and engineering, respectively.

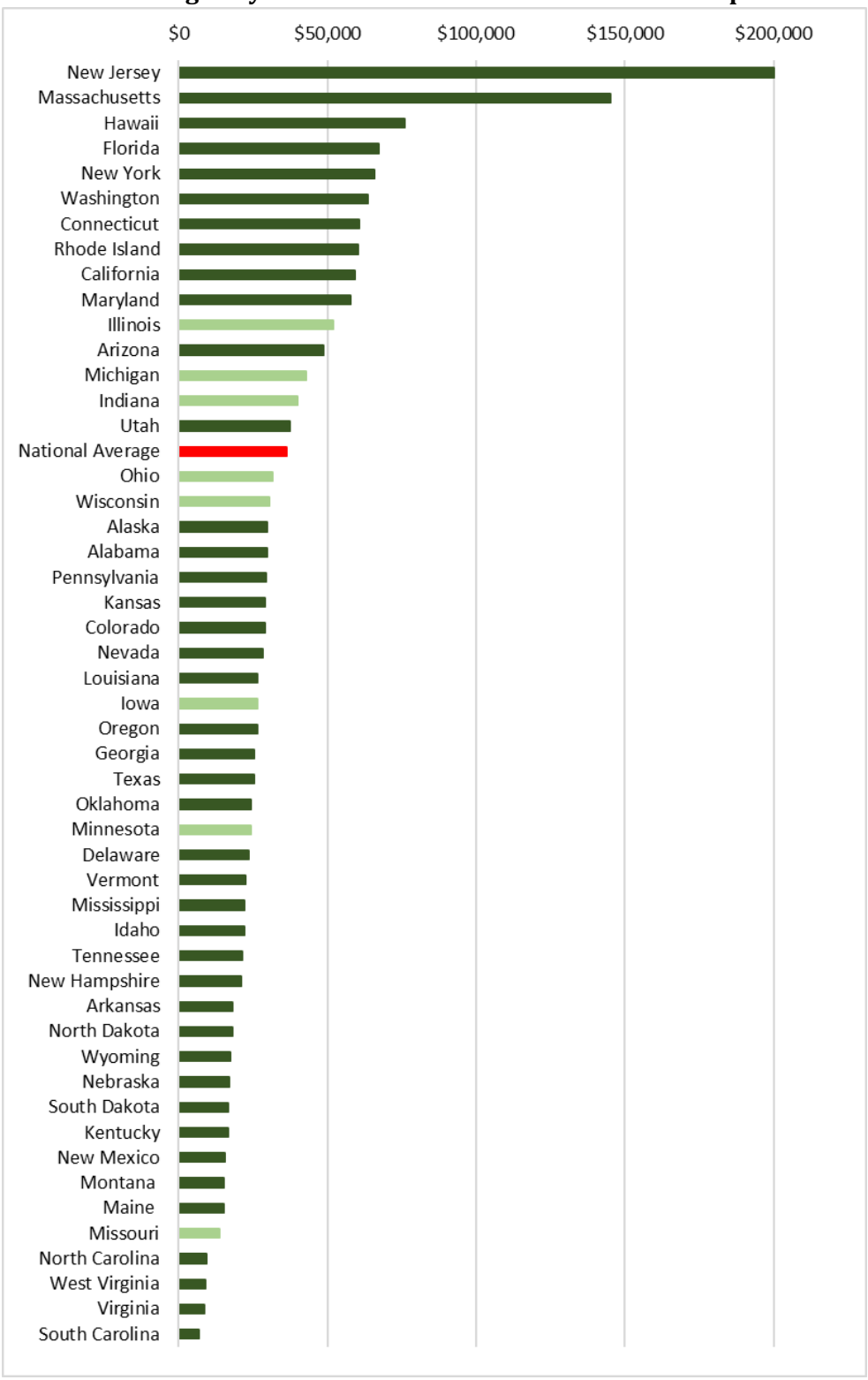
CONSTRUCTION COSTS AND WAGES

Labor is another factor in project costs, yet higher wages do not consistently equate to higher construction costs per lane mile. Fifteen states have construction costs per lane mile that fall above the national average; however, when those are compared to the mean hourly wages for a predominant trade involved in road construction (operating engineers) and highway maintenance workers, there is no clear pattern indicating that higher construction cost states also have higher wages (Figure 3). In fact, of these 15 states, the hourly wages for operating engineers in five states and highway maintenance workers in five states fall below the national average. Similarly, nine states with below average construction costs have higher than average operating engineer hourly wages. It is obvious in Figure 3 that hourly wages vary across states. As an example, Florida has the fourth highest construction costs per lane mile, but the 47th highest hourly wage for operating engineers. Unlike the comparison of population density and urban lanes miles above, a consistent pattern indicating that states with higher construction costs will have higher wages is not as prominent.

MIDWEST CONSTRUCTION COSTS

In comparison to the nation, the eight Midwestern states (Illinois, Indiana, Iowa, Michigan, Minnesota, Missouri, Ohio, and Wisconsin) fall within the middle range of highway construction costs per lane mile, with only three ranking above the national average (Figure 4). As previously described, the Midwest's flat landscape and moderate population density likely contribute to overall lower costs; specifically, five of the eight states fall below the national average, with Missouri and Minnesota ranking among the lowest cost states.

Figure 4: Midwest Highway Construction Costs Per Lane Mile* Compared Nationally



* Cost Per Lane Mile calculated by dividing annual construction costs for state highway agency administered roadways (FHWA Table SF-4C), respectively, by total state highway agency administered lane miles (FHWA Table HM-81) for each state for every year between 1993 and 2015; values were then averaged to determine the final cost per lane mile. Annual construction costs were converted to 2015 dollars using Bureau of Labor Statistics CPI-U prior to the calculation.

Figure 5 summarizes highway construction costs and compares infrastructure and population density data in the Midwest. While the Midwest has a fairly consistent landscape, the states' densities and urban landscapes vary widely with, most notably, Illinois home to Chicago. As previously mentioned, higher construction costs are evident in denser, urban areas which have more complicated infrastructure. The four Midwestern states with the highest costs – Illinois, Michigan, Indiana, and Ohio – also have the highest population densities and number of bridges per lane mile. Specifically, Illinois, which has the highest construction costs, has a population density 2.6 times the national average and 4.2 times Iowa's.

Figure 5: Highway Construction Costs and Other Parameters, Eight Midwest States

State	Highway Construction Costs	Population Density	State Owned Infrastructure (2015)*	
	Cost Per Lane Mile (2015 Dollars)*	Population Per Square Mile (2010)	Number of Bridges Per Lane Mile	Percent of Total National Bridges
Illinois	$51,907	231.1	0.19	2.8%
Michigan	$42,887	174.8	0.16	1.6%
Indiana	$39,977	181.0	0.20	2.0%
Ohio	$31,571	282.3	0.21	3.7%
Wisconsin	$30,566	105.0	0.18	1.9%
Iowa	$26,436	54.5	0.18	1.4%
Minnesota	$24,190	66.6	0.13	1.3%
Missouri	$13,899	87.1	0.14	3.6%
National Average	$36,473	87.4	0.15	-

* Cost Per Lane Mile calculated by dividing annual construction costs for state highway agency adminstered roadways (FHWA Table SF-4C) by total state highway agency administered lane miles (FHWA Table HM-81) for each state for every year between 1993 and 2015; values were then averaged to determine the final cost per lane mile. Annual construction costs were converted to 2015 dollars using Bureau of Labor Statistics CPI-U prior to the calculation.

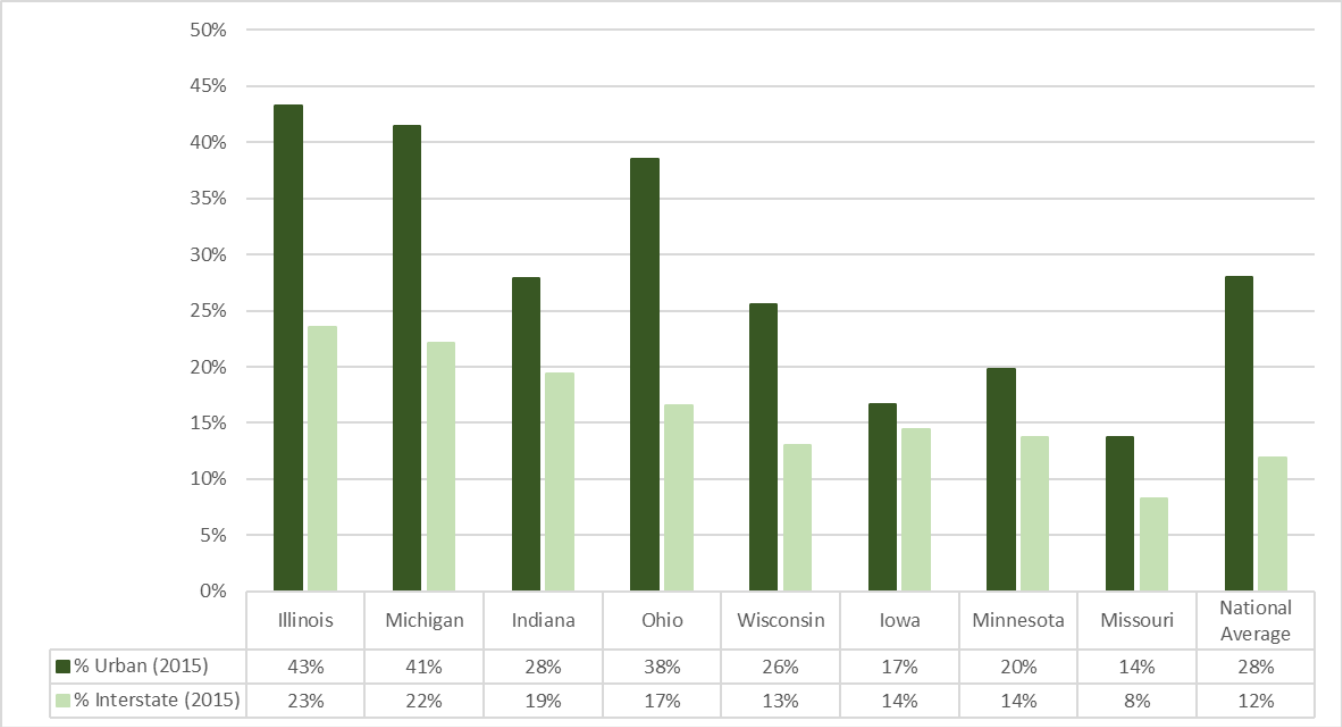
Sources: U.S. Census Bureau (Population Density); FHWA National Bridge Inventory (Infrastructure)

Similarly, the four states with the highest construction costs also have the highest percentage of urban and interstate lane miles throughout the Midwest and well above the national average. For example, Illinois has over 3.0 times and Michigan has 2.9 times the number of interstate lane miles than Missouri. Furthermore, Illinois and Michigan have 13 percent more urban lane miles than the national average, whereas Iowa has only half of the national average (Figure 6). Urban areas have stricter design standards to handle higher volumes of traffic, more complicated intersections, and more significant congestion to combat, thus leading to a more complicated construction process and higher costs.

Similar to the national comparison, higher wages do not equate to higher construction costs in the Midwest. Across the Midwest, road construction worker wages are generally higher per hour than the national average (Figure 7). As an example, compared to the national average, construction workers in Wisconsin are paid higher wages per hour. Operating engineers in Wisconsin earn 14 percent more than the national average and highway maintenance workers in the state earn 7 percent more than the national average. Construction costs per lane mile, however, are 16 percent lower in Wisconsin than the national average. Similarly, road construction worker wages in Minnesota are 17 percent to 18 percent higher than the national average; yet construction disbursements per lane mile are 34 percent below the national average. While two of the three states with higher construction costs do have higher than average wages, it is important to note that of the five Midwestern states with lower than average construction costs per lane mile, four have higher operating engineer wages, ranging from 7 to 17 percent above the national average. Consequently,

it is clear that a state can have higher wages without higher construction costs. Overall, there is no clear evidence that higher wages lead to higher construction costs.

Figure 6: 2015 State Administered Urban and Interstate Lane Miles, Eight Midwest States



Source: Federal Highway Administration, Highway Statistics Tables HM-60 and HM-81

Figure 7: Construction Cost Per Lane Mile and Hourly Wages Compared to the National Average, Eight Midwest States

State	Highway Construction Costs (2015 Dollars)			2015 Hourly Wages**			
	Cost Per Lane Mile*	National Rank	% Difference from National Average	Operating Engineers	% Difference from National Average	Highway Maintenance Workers	% Difference from National Average
National Average	$ 36,473	-	-	$ 23.61	-	$ 18.36	-
Illinois	$ 51,907	11	42%	$ 34.40	46%	$ 21.46	17%
Michigan	$ 42,887	13	18%	$ 22.72	-4%	$ 19.62	7%
Indiana	$ 39,977	14	10%	$ 25.49	8%	$ 16.40	-11%
Ohio	$ 31,571	16	-13%	$ 25.34	7%	$ 18.28	0%
Wisconsin	$ 30,566	17	-16%	$ 26.83	14%	$ 19.56	7%
Iowa	$ 26,436	25	-28%	$ 22.45	-5%	$ 20.53	12%
Minnesota	$ 24,190	30	-34%	$ 27.60	17%	$ 21.70	18%
Missouri	$ 13,899	46	-62%	$ 25.46	8%	$ 16.09	-12%

* Cost Per Lane Mile calculated by dividing annual construction costs for state highway agency adminstered roadways (FHWA Table SF-4C) by total state highway agency administered lane miles (FHWA Table HM-81) for each state for every year between 1993 and 2015; values were then averaged to determine the final cost per lane mile. Annual construction costs were converted to 2015 dollars using Bureau of Labor Statistics CPI-U prior to the calculation.

** Hourly Wages are mean wages for 2015 from the Bureau of Labor Statistics.

CONCLUSION

An assortment of variables factor into highway construction costs, including geography, population density, and design standards. Despite clear patterns emerging that connect high density and urban areas with higher costs, the same conclusion is not evident when considering the hourly wages of

operating engineers and highway maintenance workers. In general, it is difficult to provide an exact comparison of construction costs between states due to varying geography and needs; however, this report provides a foundation to understand construction spending throughout the nation.

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