



# 2022 ECONOMIC ASSESSMENT OF THE ENGINEERING AND DESIGN SERVICES INDUSTRY

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# INTRODUCTION

This is the third annual release of the Engineering and Design Services industry forecast. In 2020, the ACEC Research Institute first commissioned a series of studies – the Industry Impact Series – to profile and analyze performance in the Engineering and Design Services industry (A/E Services).

This study is updating that series which aims to describe, measure, and analyze the economic significance of the Engineering and Design Services industry and demonstrate the inextricable partnership between engineering, architects, and other design services to deliver the built environment of the United States. The built environment refers to all human-made surroundings that provide the setting for human activity, ranging in scale from buildings and parks/green space to neighborhoods and cities including their supporting infrastructure, such as roads, bridges, water supply and energy networks.

The study was conducted by Rockport Analytics, an independent market and economic research firm using both publicly and privately available data, as well as proprietary analysis. The overarching goals of this research are to:

- Build on the previously defined Engineering and Design Services sector by updating published recurring data and tracking performance for ACEC’s many constituencies.
- Provide a comprehensive view of the size, growth, and composition of the engineering and related professional services sector using the most current and comprehensive data available.
- Measure the economic contribution of the Engineering and Design Services industry using established metrics found in virtually all industry economic impact analysis.
- Analyze the current market environment for the Engineering and Design Services sector, including key challenges and opportunities. This includes modeling key market and macro drivers of the industry to help inform ACEC’s membership on the future performance of the Engineering and Design Services industry. The outlook and modeling assets can be used to forecast industry revenue in the Engineering and Design Services sector and evaluate scenarios surrounding policy, geopolitical, and other future conditions.

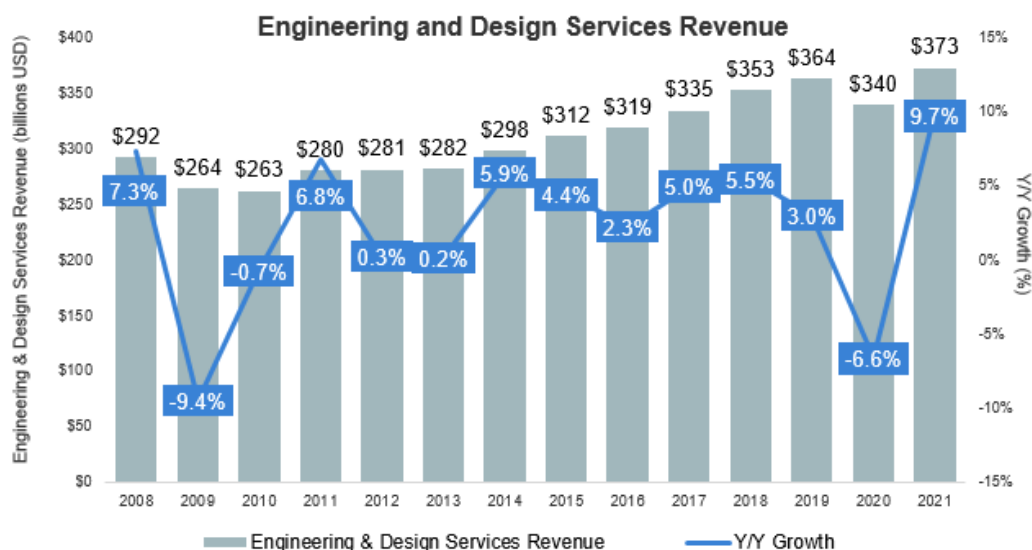
This research is intended to be of value to ACEC members and their constituents. It will provide industry insight to members and can be leveraged as a planning and educational resource. It will also assist ACEC advocacy, communications, and other outreach efforts.

# OVERVIEW OF INDUSTRY PERFORMANCE IN 2021

## Engineering and Design Services Soars Back Above Pre-Pandemic Levels

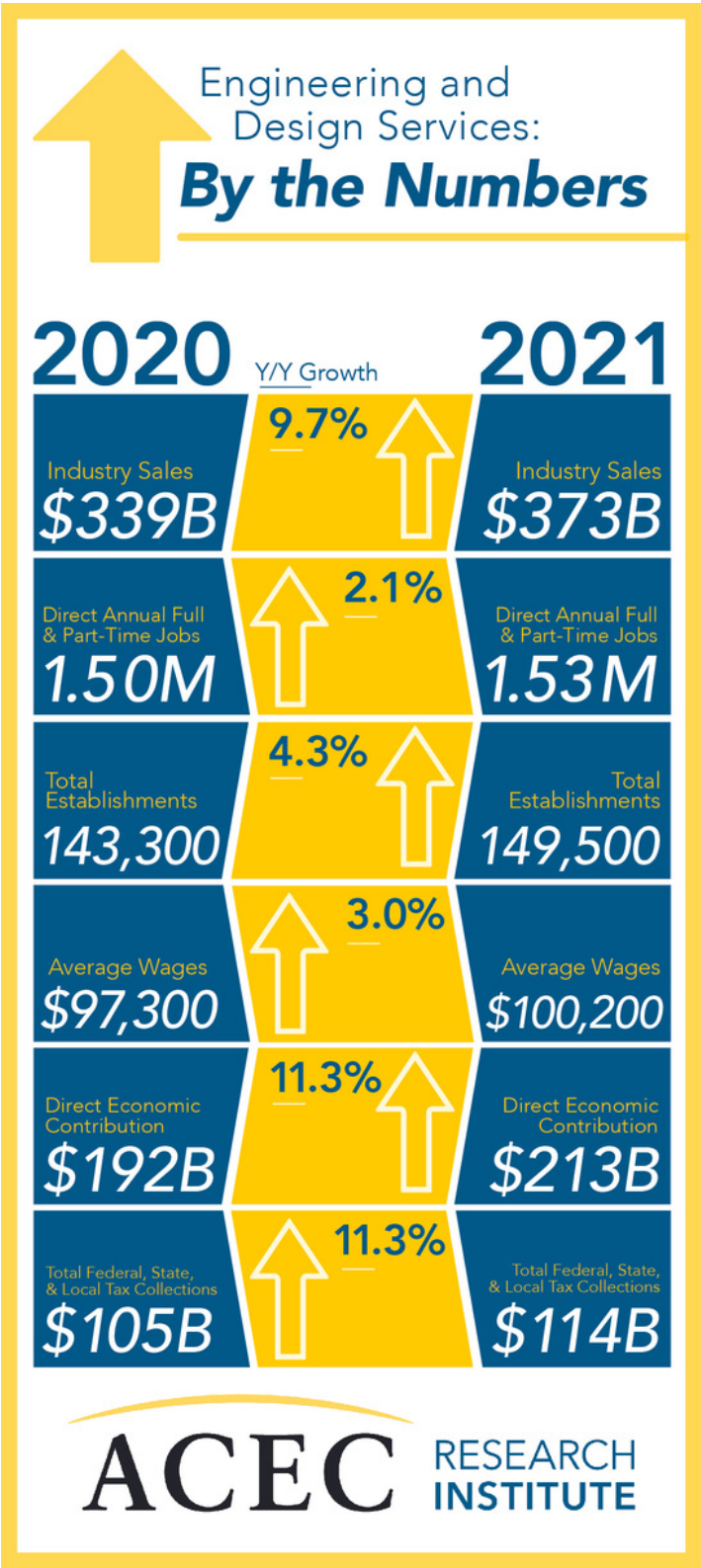
The Covid-19 pandemic had an outsized impact on the Engineering and Design Services sector. Many construction projects were canceled, disrupted, or delayed. The A/E industry is particularly sensitive to economic cycles, and the sharp economic downturn in 2020 led to an even sharper decline in A/E activity, which plummeted 7 percent from 2019 levels. The industry came surging back in 2021, however, recovering the \$24 billion that was lost in 2020 and adding another \$9 billion. A total of \$373 billion in direct economic output<sup>1</sup> was generated industry wide.

- Strong performance in 2021 was driven by unprecedented levels of monetary and fiscal stimulus, healthy household balance sheets, relatively low interest rates, rebounding corporate profits, and strong demand for both residential and non-residential construction.
- Even during the downturn, A/E employment remained intact as firms likely did not want to part with engineers and other talent given an extremely tight labor market. These conditions continued to tighten in 2021 and employment grew only 2.1 percent, to 1.53 million jobs, despite industry revenue soaring nearly 10 percent.
- Average industry wages increased 3 percent in 2021 to just over \$100,000 per year. This average wage includes a broad cross-section of occupations in the Engineering and Design Services industry. This average represents engineers, drafters, and architects but also administrative support, management, and other occupations. Given the tight labor market, these wage increases were relatively subdued. Lighter-than-expected wage increases were driven by two main factors: (1) wage gains tend to lag economic growth and tightening labor conditions implying that much of the wage growth would not be expected until 2022 or 2023. (2) Many retiring Baby Boomers who have recently left the workforce have been replaced by less experienced and less expensive employees.



<sup>1</sup> "Economic output" is a standard governmental naming convention and is essentially equivalent to industry revenue or sales.

# ENGINEERING AND DESIGN SERVICES 2020 VS. 2021



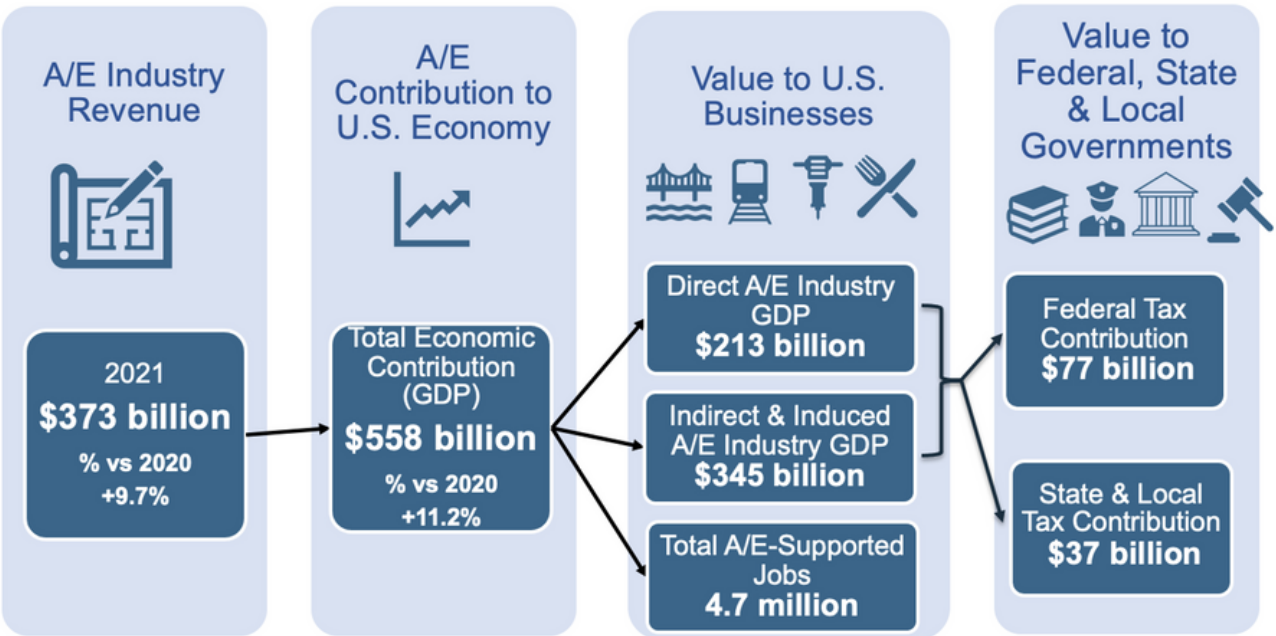
<sup>1</sup> QCEW updated Total Establishments and Average Wages for 2020  
Bureau of Economic Analysis, Quarterly Census of Employment and Wages, Bureau of Labor Statistics, IMPLAN, Rockport Analytics

# ENGINEERING AND DESIGN SERVICES MADE A SIGNIFICANT CONTRIBUTION TO THE US ECONOMY IN 2021

Typically, an industry’s economic significance is measured by how much it sells of its product or service, how much it buys from other sectors, the number of jobs it directly and indirectly supports, and how much tax revenue it generates. This approach, and the economic contribution metrics derived from it, are universal across all industries, facilitating comparison and contrast. While A/E Services contribute significantly to the construction industry, the figures below do not include the value of the built environment supported by those services. That would be part of the Construction Sector’s economic contribution. Instead, the metrics below include only the unique economic footprint of the Engineering and Design Services industry itself.

## Economic Contribution Bottom Line

### Engineering and Design Services Industry Economic Contribution is Significant



Engineering and Design Services 2021 revenue increased 9.7 percent over 2020. Revenue (\$373 billion) includes sales to public and private construction, business services, mining, manufacturing, exports, and other end-market sectors.

The industry’s contribution to U.S. GDP totaled \$558 billion and was up 11.2 percent compared to 2020. Each dollar in A/E revenue contributes \$1.50 to GDP. The components of total economic contribution include direct, indirect, and induced value-added. Direct (\$213 billion) refers to the value-added of businesses engaged in engineering, architectural, and surveying services (NAICS Code 5413). Indirect refers to A/E’s supply chain businesses. Induced contributions arise from the re-spent wages of direct and indirect employees. Indirect and induced (\$345 billion) comprise upstream and downstream effects.

Engineering and Design Services contributed \$77 billion in federal taxes in 2021. Federal taxes include corporate and personal income taxes, social security, and various excise fees. The industry contributed another \$37 billion in state and local taxes. State and local taxes include sales, income, property, excise, and other licenses/fees.

Engineering and Design Services directly employed more than 1.5 million Americans. Considering both the up and downstream contribution of A/E's activities, a total of more than 4.7 million full- and part-time jobs can be attributed to the A/E industry. Engineering and Design Services contribution to payrolls was \$335 billion in 2021.

## 2021 Engineering and Design Services Industry Bottom Line

For the U.S. Economy <small>in billions of \$ unless otherwise noted</small>	Direct	Indirect (Supply Chain)	Induced (Ripple Effect)	Total	% vs 2020
Total Industry Revenue				\$372.6	9.7%
Total Economic Contribution					
A/E Contribution to GDP	\$213.4	\$125.6	\$219.3	\$558.3	11.2%
Jobs Supported (Full & Part-Time, in thousands)	1,527	1,252	1,936	4,715	4.0%
Contribution to Payrolls	\$153.0	\$74.7	\$107.6	\$335.3	5.1%
Total Tax Receipts (in billions)	\$41.7	\$24.9	\$47.0	\$113.6	11.3%
Federal	\$33.8	\$16.9	\$26.4	\$77.1	11.3%
State & Local	\$7.9	\$8.0	\$20.6	\$36.5	11.2%

Source: Bureau of Economic Analysis, Bureau of Labor Statistics, IMPLAN, Rockport Analytics

## Putting the Benefits of the Engineering and Design Services Industry in Perspective



### Total A/E Revenue: \$372B

This was 9.7% higher than revenue in 2020. A/E services revenue represents **1% of U.S. revenue**. The majority (76%) of this revenue was generated from Engineering Services, only 24% by Architectural Services in 2021.



### Gross Domestic Product: \$558B

The Engineering and Design Services industry contribution to U.S. GDP was up 11.2% from 2021. This includes the industry's direct value-added plus supply chain and income ripple effect. The Engineering and Design Services industry accounts for **2.7% of U.S. GDP**.



### Total Employment: 4.7 million

The Engineering and Design Services industry directly employed 1.5 million workers and another 3.2 million upstream and downstream workers. Total employment supported by the industry was up 4% from 2020. **A/E employment accounts for 3.8% of total U.S. employment.**



### Total A/E Wages: \$335B

Engineering and Design Services industry wages increased 5.1% over 2020. **This includes both full- and part-time workers and accounts for 3.5% of total U.S. wages.** The average wage grew by 3% to \$100,200.



### Supporting \$1.6T in Construction Put In Place

Engineering and Design Services is inextricably linked to the built environment and **is a critical input to nearly every major construction project in the U.S.**



### State and Local Taxes: \$36.5B

The Engineering and Design Services industry generates enough state and local taxes to support 553,000 police officers (**68% of all officers**), 550,000 teachers (**17% of all teachers**), or 2.4 million students (**5% of all U.S. students**).



## Engineering and Design Services Economic Contribution by Industry and State

- Assessing the economic contribution of the Engineering and Design Services industry is an exercise in tracking the interindustry relationships between A/E activity and its upstream and downstream industry partners. This can be done at both the national and state levels.
- At the national level, more than 4.7 million U.S. jobs, including full- and part-time workers, can be attributed to the Engineering and Design Services industry. This is 3.8 percent of all U.S. employment.
- Direct A/E industry jobs totaled 1.53 million in 2021. Meanwhile, the industry's supply chain supported another 1.3 million U.S. jobs (e.g., administrative services sector with 347,000 jobs).
- More than 350,000 hospitality workers owed their jobs to A/E industry activity in 2021. Likewise, the Engineering and Design Services industry supported 254,000 retail jobs and nearly 346,000 healthcare jobs.

### A/E Contribution to U.S. Employment by Industry Sector

Industry (NAICS) <sup>1</sup>	Direct	Indirect	Induced	Total
54 Professional- Scientific & Tech Services	1,527,130	341,810	103,370	1,972,320
56 Administrative & Waste Services	0	346,590	115,770	462,360
72 Accommodation & Food Services	0	118,760	232,010	350,770
62 Health & Social Services	0	20	345,570	345,590
44-45 Retail Trade	0	6,520	247,480	254,000
81 Other Services	0	31,460	189,950	221,410
53 Real Estate & Rental	0	91,040	95,670	186,700
52 Finance & Insurance	0	40,970	137,780	178,750
31-33 Manufacturing	0	64,840	84,210	149,050
48-49 Transportation & Warehousing	0	60,890	85,020	145,910
42 Wholesale Trade	0	32,200	51,340	83,540
71 Arts- Entertainment & Recreation	0	19,130	58,180	77,310
55 Management of Companies	0	42,540	24,840	67,380
51 Information	0	28,930	33,690	62,620
61 Educational Services	0	1,350	57,110	58,460
11 Agriculture, Forestry, Fishing, & Hunting	0	4,940	34,920	39,870
23 Construction	0	6,720	14,590	21,310
92 Government	0	3,180	11,280	14,460
22 Utilities	0	4,900	8,310	13,210
21 Mining	0	5,490	4,930	10,430
<b>Total</b>	<b>1,527,130</b>	<b>1,252,290</b>	<b>1,936,020</b>	<b>4,715,440</b>

<sup>1</sup>North American Industrial Classification System (NAICS). For specific industry definitions, see [www.census.gov](http://www.census.gov)

Sources: Rockport Analytics, IMPLAN



- At the national level, the Engineering and Design Services industry initiates \$77.1 billion in federal tax revenue and \$36.5 billion in state and local taxes for a total of nearly \$114 billion tax impact.

### Engineering and Design Services Industry Initiated Taxes

	2021 Tax Collections (in millions \$)	2021 % of Total
<b>Federal – U.S.</b>		
Corporate Income	\$3,173	2.8%
Personal Income	\$29,529	26.0%
Excise & Fees	\$3,252	2.9%
Social Security & Other Taxes	\$41,131	36.2%
<b>Federal Tax Total</b>	<b>\$77,085</b>	<b>67.9%</b>
<b>State &amp; Local</b>		
Corporate Income	\$1,389	1.2%
Personal Income	\$7,671	6.8%
Social Insurance Taxes	\$686	0.6%
Business Taxes	\$13,826	12.1%
Household Taxes	\$1,940	1.7%
Property Taxes	\$10,989	9.7%
<b>State &amp; Local Tax Total</b>	<b>\$36,500</b>	<b>32.1%</b>
<b>Total A/E - Initiated Taxes</b>	<b>\$113,585</b>	<b>100%</b>

Source: Rockport Analytics, IMPLAN, Bureau of Economic Analysis,  
Bureau of Labor Statistics, U.S. Census Bureau

- The exhibits that follow track the contributions of the A/E industry to all 50 states and the District of Columbia.
- The Engineering and Design Services industry makes far and away its largest contributions to the GDP of California and Texas, \$81.6 billion and \$74.1 billion, respectively. It is no surprise given that these two states contain the most A/E firm locations and, given that most A/E activity is regional, the most industry revenue. The second-tier states of Florida, Michigan, New York, Virginia, and Colorado show A/E sector GDP contributions registering between \$22 and \$32 billion. Why is Michigan so high? Digging deeper into the data reveals that, in addition to A/E operations dedicated to construction activity, there is a heavy concentration of Engineering and Design Services firm's revenue that is dedicated to the automotive industry, a staple of the Michigan economy.

**Engineering and Design Services Industry**  
**Total Economic Contribution**  
Top 20 States in 2021

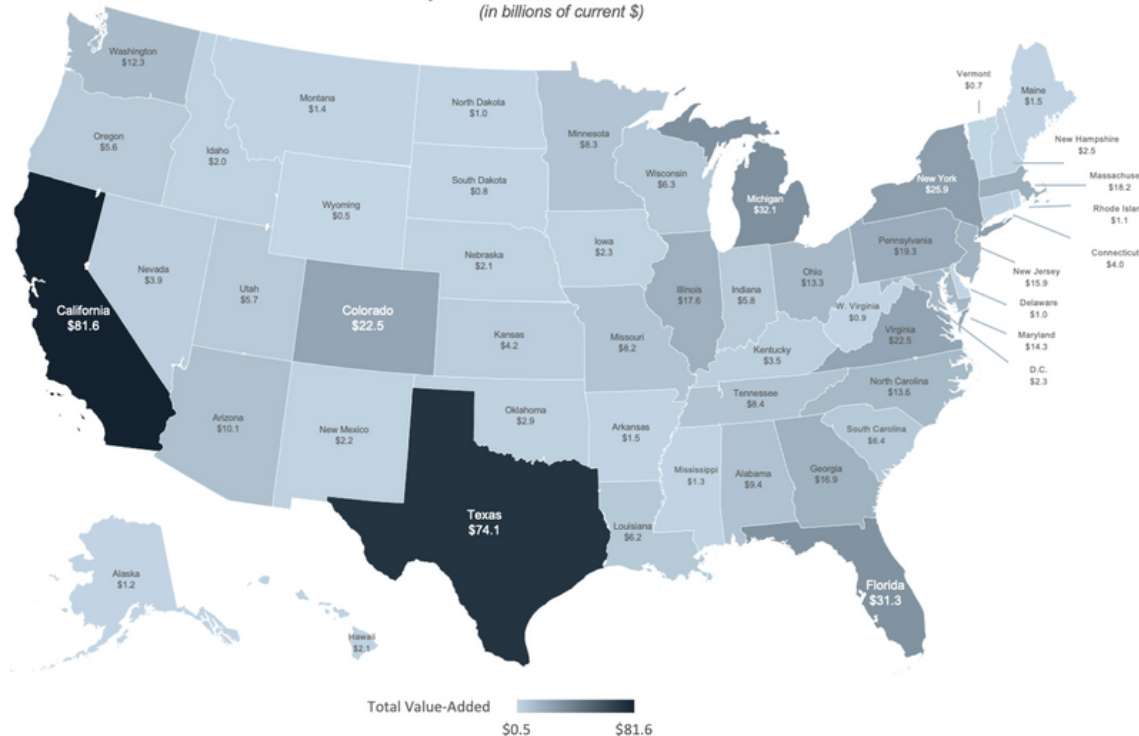
<b>Rank</b>	<b>State</b>	<b>Total Value-Added</b> (GDP, in bils \$)	<b>% of U.S.</b>	<b>Total Jobs Supported</b> (x1000)	<b>% of U.S.</b>	<b>Total Paid Wages</b> (in mils \$)
1	California	\$81.6	14.6%	587	12.4%	\$49
2	Texas	\$74.1	13.3%	535	11.3%	\$41
3	Florida	\$32.1	5.7%	244	5.2%	\$20
4	Michigan	\$31.3	5.6%	316	6.7%	\$19
5	New York	\$25.9	4.6%	234	5.0%	\$16
6	Virginia	\$22.5	4.0%	165	3.5%	\$13
7	Colorado	\$22.5	4.0%	178	3.8%	\$14
8	Massachusetts	\$19.3	3.5%	186	3.9%	\$12
9	Pennsylvania	\$18.2	3.3%	129	2.7%	\$11
10	Illinois	\$17.6	3.2%	151	3.2%	\$10
11	New Jersey	\$16.9	3.0%	153	3.2%	\$10
12	Georgia	\$15.9	2.8%	126	2.7%	\$10
13	Maryland	\$14.3	2.6%	124	2.6%	\$9
14	Ohio	\$13.6	2.4%	137	2.9%	\$8
15	North Carolina	\$13.3	2.4%	131	2.8%	\$8
16	Washington	\$12.3	2.2%	96	2.0%	\$8
17	Arizona	\$10.1	1.8%	98	2.1%	\$6
18	Minnesota	\$9.4	1.7%	81	1.7%	\$6
19	Tennessee	\$8.4	1.5%	72	1.5%	\$5
20	Alabama	\$8.3	1.5%	70	1.5%	\$5
<b>Total U.S.</b>		<b>\$558.3</b>	<b>100.0%</b>	<b>4715</b>	<b>100.0%</b>	<b>\$335</b>

Source: Rockport Analytics, IMPLAN, Bureau of Economic Analysis, Bureau of Labor Statistics, US Census Bureau

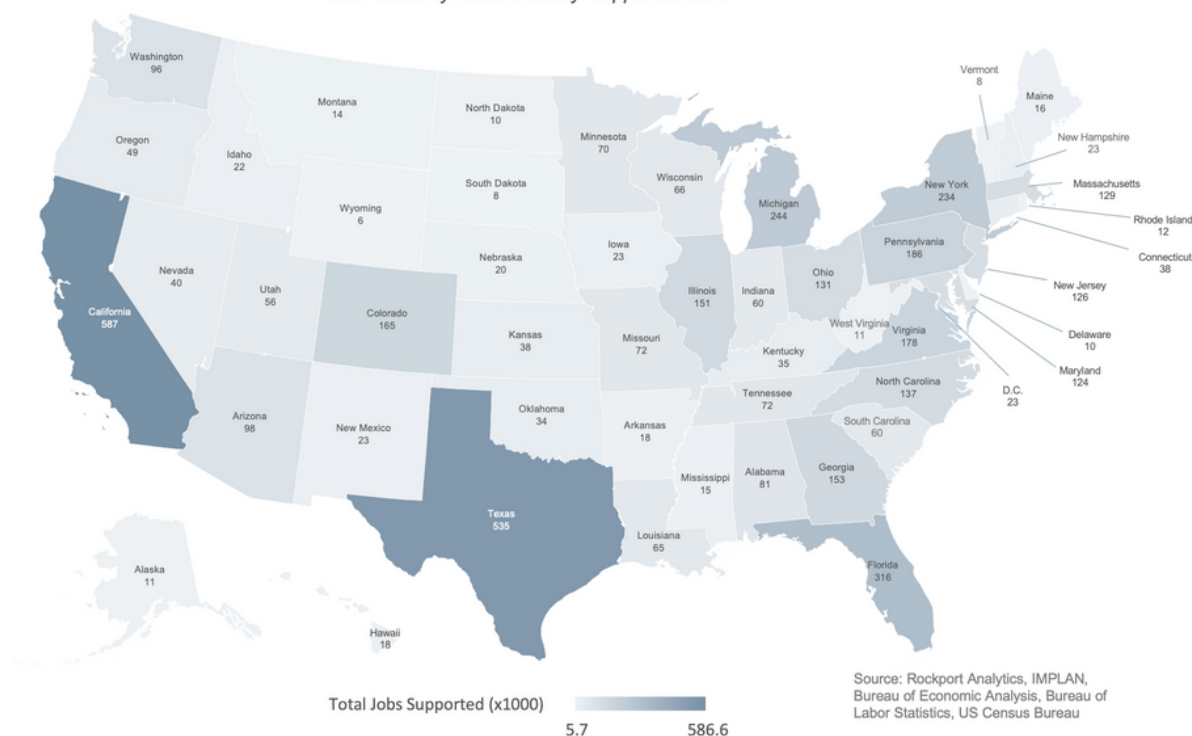
- The maps below show the economic contribution by state and total number of jobs supported by each state. California and Texas are the two largest contributors to the industry for both economic contribution and jobs. California employs nearly 587,000 workers in the Engineering and Design Services industry, while Texas employs more than 535,000. Even the smaller contributors, Wyoming for example, produce significant value-added. Wyoming's economic contribution in 2021 was \$452 million, and the state supported more than 5,600 workers.

# THE ENGINEERING AND DESIGN SERVICES INDUSTRY IS RESPONSIBLE FOR 2.7 PERCENT OF TOTAL U.S. GDP AND 4 PERCENT OF ALL JOBS.

2021 State-by-State Contributions to GDP or Value-Added  
(in billions of current \$)



2021 State-by-State Industry-Supported Jobs



Source: Rockport Analytics, IMPLAN, Bureau of Economic Analysis, Bureau of Labor Statistics, US Census Bureau



- The table below shows Engineering and Design Services industry revenue for the top 20 states, ranked by 2021 growth. New Hampshire grew by 20 percent over 2020, followed by Idaho at 19 percent. The individual 30 states plus DC that are not included in the table grew 8 percent in aggregate from 2020 to 2021. California is the largest state by revenue (\$53 billion), experiencing 11 percent year-over-year growth for 2021. The state of Texas has the next largest revenue (\$43 billion) and experienced 7 percent year-over-year growth in 2021.
- Detailed tables showing Engineering and Design Services industry contribution for each state across all metrics are available in Appendix I of this report.

### Engineering and Design Services Revenue by State: Top 25

Ranked By 2021 Growth in A/E Revenue

State	2020 (in mils\$)	2021	Annual Growth
New Hampshire	\$1,645	\$1,970	20%
Idaho	\$1,290	\$1,533	19%
Wisconsin	\$3,936	\$4,639	18%
Vermont	\$474	\$551	16%
Arkansas	\$1,053	\$1,217	16%
North Carolina	\$7,754	\$8,958	16%
Montana	\$955	\$1,103	15%
Florida	\$17,612	\$20,255	15%
Arizona	\$5,560	\$6,393	15%
Kentucky	\$2,359	\$2,694	14%
Michigan	\$19,954	\$22,652	14%
Mississippi	\$909	\$1,030	13%
Colorado	\$12,171	\$13,740	13%
Tennessee	\$4,760	\$5,367	13%
Georgia	\$9,227	\$10,396	13%
South Dakota	\$558	\$628	13%
Ohio	\$7,978	\$8,929	12%
Nebraska	\$1,415	\$1,583	12%
Indiana	\$3,681	\$4,114	12%
Utah	\$3,202	\$3,566	11%
Iowa	\$1,649	\$1,837	11%
South Carolina	\$3,985	\$4,408	11%
California	\$47,940	\$53,023	11%
Minnesota	\$5,107	\$5,646	11%
Oregon	\$3,570	\$3,938	10%
Other States	\$170,457	\$182,431	7%
Total U.S.	\$339,200	\$372,600	10%

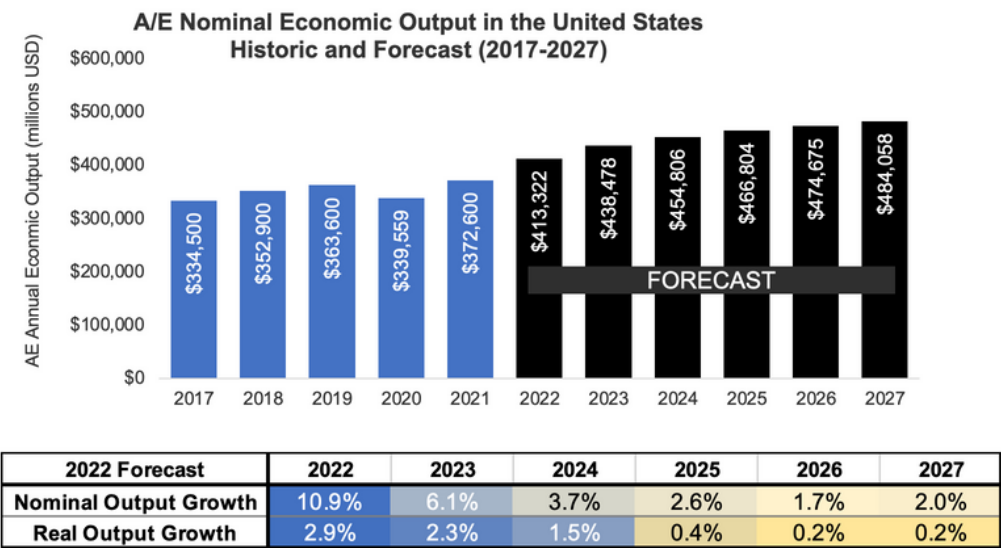
Source: Rockport Analytics, U.S. Census Bureau

# ENGINEERING AND DESIGN SERVICES INDUSTRY IN 2022 AND BEYOND

## Tremendous Growth Prospects May be Hindered by Poor Labor Dynamics, Rising Interest Rates and the Threat of Recession

The Engineering and Design Services industry came roaring back in 2021 after declining 7 percent in 2020 as the Covid-pandemic led to project disruptions and a sharp, but short-lived, recession slowed economic activity. Economic output<sup>2</sup> in Engineering and Design Services grew at a nearly double-digit pace in 2021, advancing to \$372.6 billion. This momentum was punctuated by the passing of the Infrastructure Investment and Jobs Act (IIJA) in November, adding to the tailwinds already in place for the industry in 2022.

- We estimate that economic output in Engineering and Design Services has overtaken its pre-pandemic peak of \$363.6 billion, growing 9.7 percent to \$372.6 billion in 2021. This was 1.6 percent higher than our forecast of 8.1 percent growth published in October 2021.
- We expect A/E revenue to continue to accelerate in 2022, growing 10.9 percent to \$413.3 billion. On the surface, this is set up to be the best year for Engineering and Design Services in our measured history (going back to 2000). However, some of the growth has been eroded by inflation over the period. When adjusting for inflation, the A/E industry still will see a strong year, but the real rate of growth is expected to top out around 3 percent. We expect inflation will continue to cut into Real Output gains in 2023 as well.
- The industry is expected to grow to over \$413 billion in 2022 and surpass \$484 billion by 2027. However, there are several key challenges facing the industry in the U.S. economy, including labor shortages, soaring inflation, rising wages, continued pressure on global supply chains, rising interest rates, potential tightening of credit markets, and the rising risk of recession.



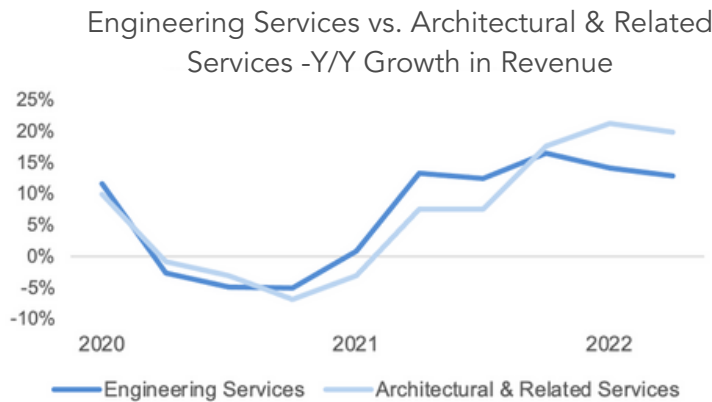
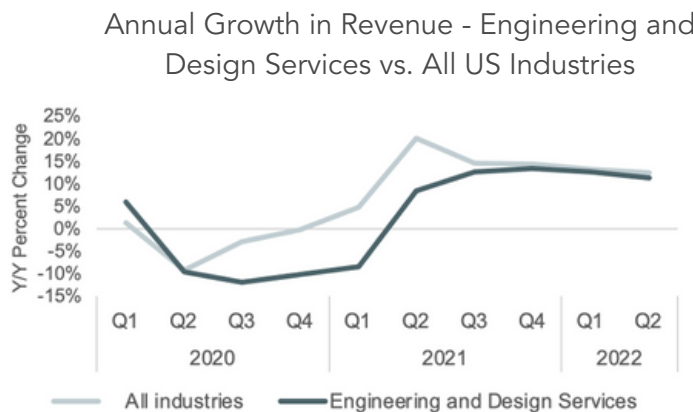
<sup>2</sup> "Economic output" is a standard governmental naming convention and is essentially equivalent to industry revenue or sales.

The Recovery in A/E Picked Up Steam in 2021 Q4 and 2022 Q1

In 2021, Engineering and Design Services began to recover from the effects of the pandemic. By the fourth quarter of 2021, A/E industry revenue growth had made significant progress toward closing the gap between the A/E industry and growth in the broader economy. Engineering and Design Services experienced 13.3 percent growth in the fourth quarter of 2021 compared to the fourth quarter of 2020. In the first quarter of 2022, A/E industry revenue is tracking but still trailing the broader economy.

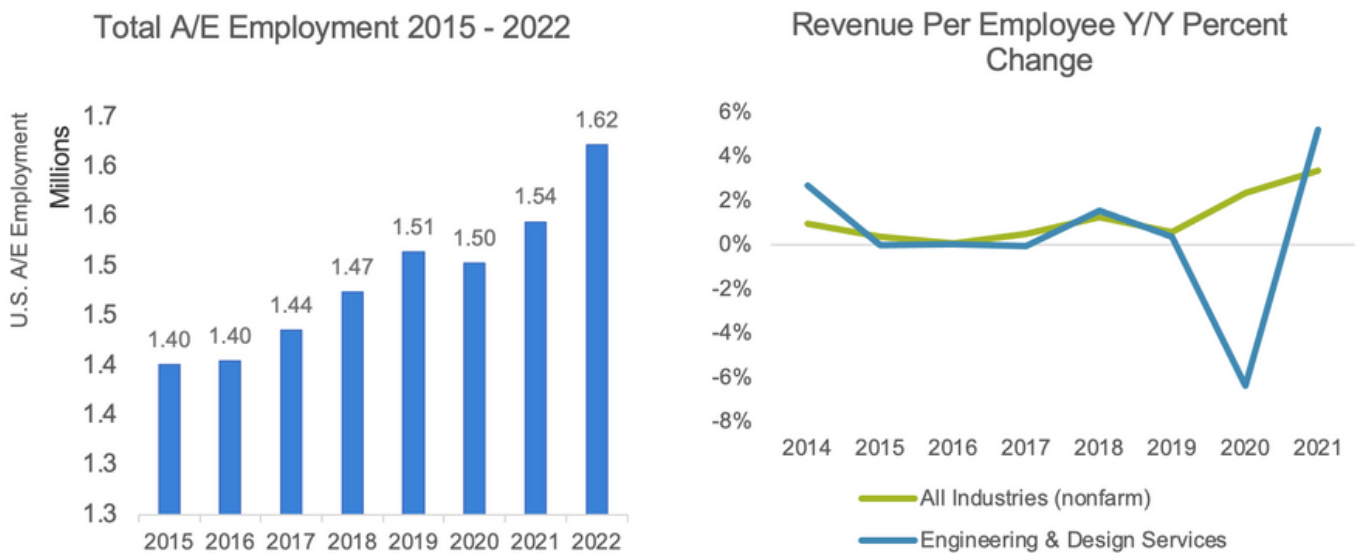
The recovery in Architectural and Related Services lagged the recovery in Engineering Services in 2021 but Architectural performance accelerated in 2022. By the end of the second quarter, both Engineering Services revenue and Architectural and Related Services revenue were 19 percent above their 2019 Q4 totals.

Employment growth has also picked up steam with average monthly employment up 4.4 percent so far in 2022. The tighter labor market has forced firms to get more out of their employees to keep pace. The chart below highlights the decline in revenue per worker in 2020 among A/E firms as revenue plummeted while firms kept up with their payrolls. This trend reversed significantly in 2021 as revenue surged and A/E firms struggled to fill vacancies.





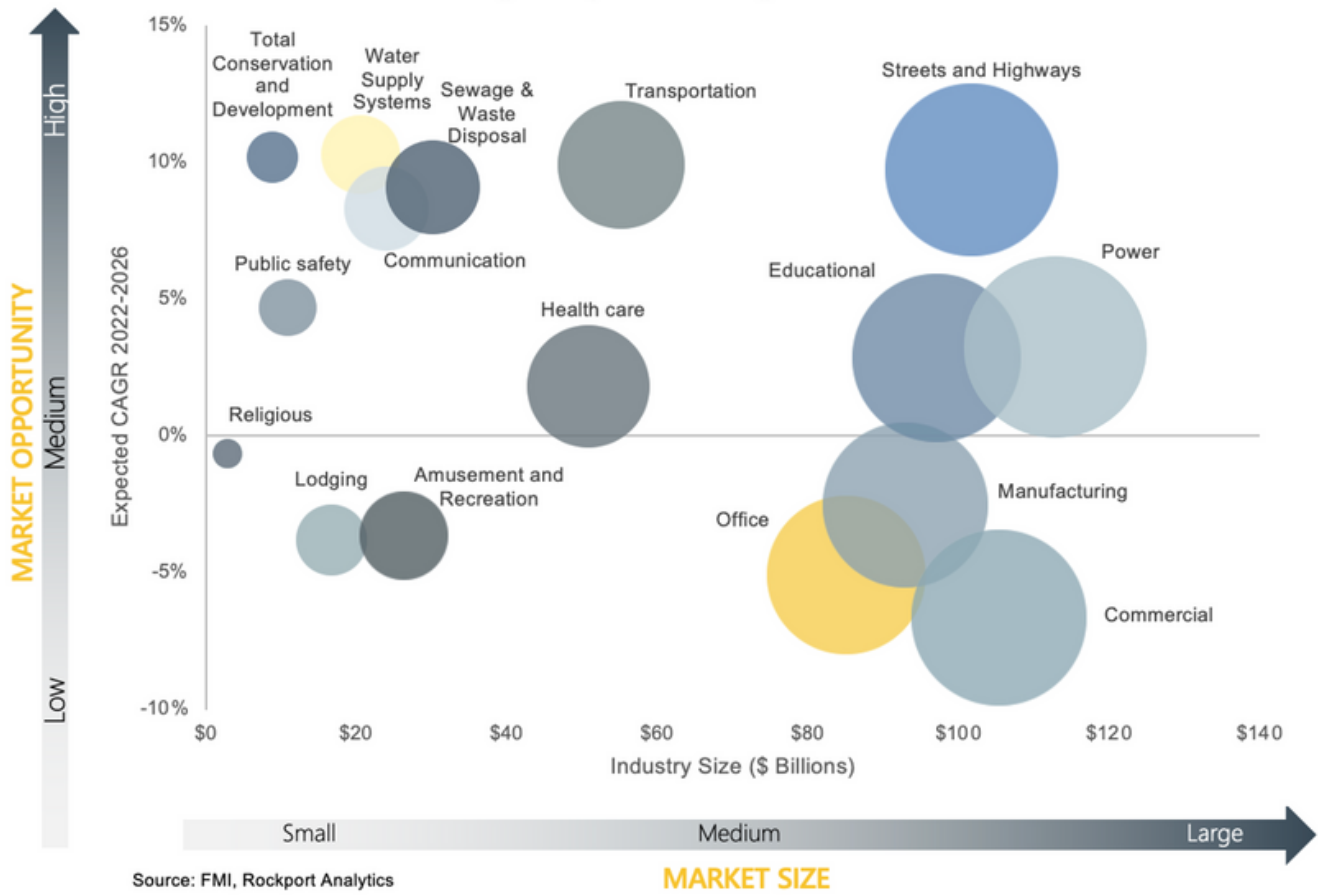
## Market Dynamics Continue to Alter the Prospects for A/E End Markets



### Residential beginning to slow after multi-year surge, IIJA provides outsized opportunity in transportation and utilities

- Residential construction remained robust in 2021 and has performed well, thus far, in 2022. While demographics, shifting buyer preferences, and an undersupply of housing provide long-term tailwind for residential, we expect more pressure to be put on the segment in the short run as interest rates rise and credit markets tighten. The latest data from the National Association of Realtors shows existing home sales down nearly 20 percent from the year prior. This comes as affordability has plummeted nearly 30 percent since January.
- The biggest bright spots in the non-residential and commercial segment this year have been manufacturing and commercial construction. Manufacturing construction has been driven by the onshoring of manufacturing and supply chains by domestic companies. Commercial has been driven by a supply-demand imbalance for apartments and condos.
- The growth opportunities over the next five years are likely to shift. We expect more cyclical markets to suffer from a slowing U.S. economy and, quite possibly, a mild or moderate recession. With the adoption of the IIJA, we expect public construction to grow significantly over the next five years. This includes A/E end markets in water and wastewater, transportation, streets and highways, and power.

## Evaluating Prospects Among A/E End Markets



In 2021, the value of U.S. construction starts grew 8.5 percent over 2020, exceeding \$1.6 trillion. In 2022, the average monthly value for the first seven months grew 10.1 percent over 2021, exceeding \$1.7 trillion

Non-Building Construction was nearly flat in 2021 compared to 2020 (0.4 percent). Total Conservation and Development experienced the largest decline, down 11.3 percent in 2021. The first seven months of 2022 are showing a 1.3 percent decline for Non-Building Construction.



In 2021, Non-Residential & Commercial Construction declined 5.7 percent but increased 3.2 percent in the first seven months of 2022. Manufacturing is experiencing the largest 2022 year-to-date growth at 23.1 percent. Commercial is also experiencing double-digit growth at 14.2 percent in 2022.



Residential Construction increased 24.6 percent in 2021 compared to 2020. In 2022, the average monthly value of Residential Construction for the first seven months is \$929 billion. Residential has increased 19.0 percent year-to-date in 2022.



### Value of Construction Put in Place: Non-Building, Non-Residential & Commercial, and Residential 2020-2022

Billions(\$)	2020	2021	2021-2020 Y/Y%	2022*	2022-2021 Y/Y%
<b>Non-Building</b>	<b>\$276</b>	<b>\$277</b>	<b>0.4%</b>	<b>\$274</b>	<b>-1.3%</b>
Water Supply Systems	\$19	\$19	1.4%	\$21	7.3%
Sewage & Waste Disposal	\$27	\$28	2.9%	\$30	7.9%
Streets and Highways	\$102	\$101	-1.6%	\$102	0.8%
Power Plants/Pipeline/Communications	\$118	\$121	2.3%	\$113	-7.2%
Total Conservation and Development	\$9	\$8	-11.3%	\$9	10.5%
<b>Non-Residential &amp; Commercial</b>	<b>\$580</b>	<b>\$547</b>	<b>-5.7%</b>	<b>\$567</b>	<b>3.2%</b>
Office	\$93	\$87	-6.7%	\$85	-2.7%
Communication	\$24	\$25	3.4%	\$24	-2.8%
Transportation	\$61	\$57	-6.7%	\$55	-5.1%
Public Safety	\$18	\$12	-31.2%	\$11	-19.5%
Lodging	\$28	\$18	-36.0%	\$17	-16.7%
Educational	\$111	\$98	-11.1%	\$97	-4.0%
Amusement and Recreation	\$28	\$25	-10.6%	\$26	2.1%
Manufacturing	\$75	\$79	4.6%	\$93	23.1%
Health Care	\$49	\$48	-0.3%	\$51	5.6%
Religious	\$3	\$3	-15.7%	\$3	-7.4%
Commercial	\$90	\$95	5.4%	\$105	14.2%
<b>Residential</b>	<b>\$644</b>	<b>\$803</b>	<b>24.6%</b>	<b>\$929</b>	<b>19.0%</b>
<b>Total Construction</b>	<b>\$1,500</b>	<b>\$1,626</b>	<b>8.5%</b>	<b>\$1,769</b>	<b>10.1%</b>
Total Public Construction	\$369	\$347	-6.0%	\$348	-1.3%
Total Private Construction	\$1,130	\$1,279	13.2%	\$1,421	13.3%

\*2022 is only January - July and July is preliminary data

Source: Rockport Analytics, U.S. Census Bureau



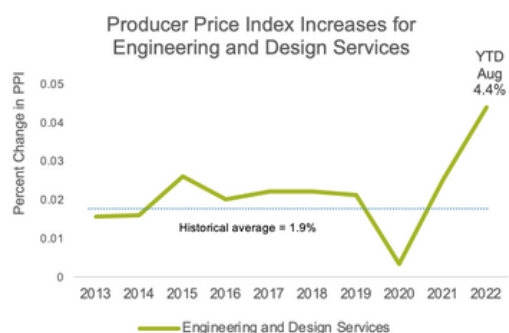
# KEY TRENDS DRIVING THE OUTLOOK FOR ENGINEERING AND DESIGN SERVICES

## IIJA begins rollout adding a significant tailwind to the recovery in Engineering and Design Services

- The \$1.2 trillion Infrastructure Investment and Jobs Act (IIJA) was signed into law on November 15, 2021. Federal funds for infrastructure projects began rolling out early in 2022 and as of May 2022, \$110 billion had been disbursed across all 50 states and 4,300 specific projects.
- The passage of the bill represents a tremendous opportunity for the Engineering and Design Services industry. Our previous research shows that of every dollar spent on public infrastructure, six cents flow directly to the A/E sector. Further, these dollars are likely to flow Engineering and Design Services firms early in the disbursement process as A/E activities generally lead construction output by two to three quarters.
- We estimate that IIJA will add \$132 billion in industry revenue in the Engineering and Design Services sector over the next five years. This represents an average annual increase in A/E economic activity (over and above the original forecast baseline) of 5.6 percent over the five-year period.

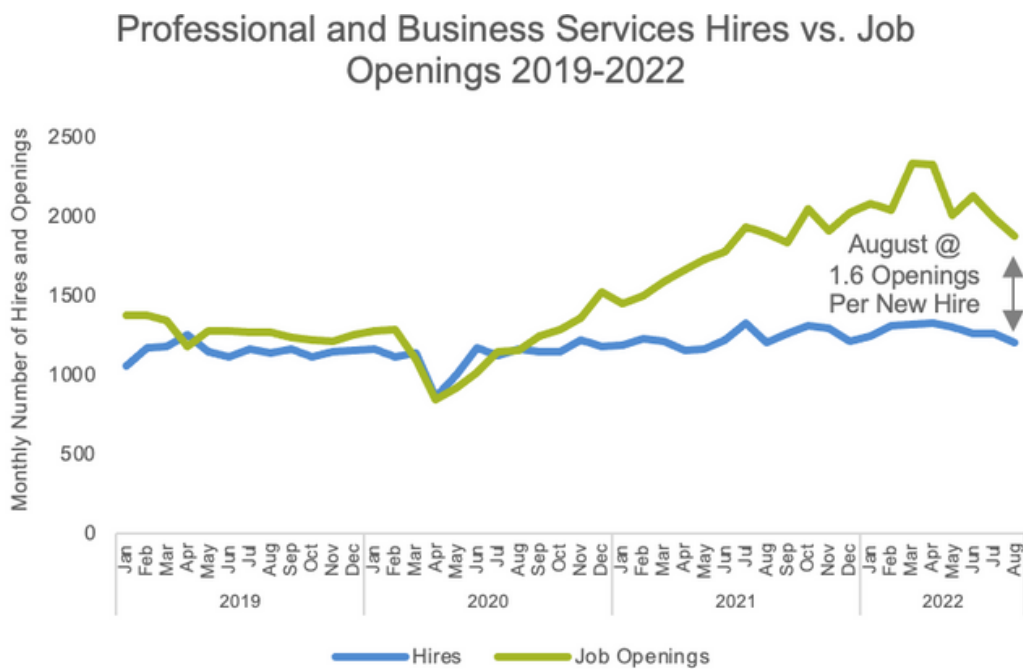
## Rising labor costs are cutting into A/E firms' margins

- Current labor shortages coupled with general pricing pressures have forced companies to pay more for top talent. Companies are offering extra incentives to join their firms over their competitor's. Paying higher wages eats into the firm's profits.
- In the second quarter of 2022, the Professional and Related Occupations sector has experienced a 4.7 percent bump in total compensation. This compares to a historical average annual percent change of only 2.2 percent. Wage gains tend to lag the broader economy and trends in employment, so we suspect these gains to continue well into 2023, unless the U.S. falls into a moderate to severe recession.
- Not surprisingly, the Producer Price Index (PPI) for Engineering and Design Services exhibits a similar trend, rising 2.5 percent in 2021 and another 4.4 percent year-to-date in 2022. This compares to a historical average of 1.9 percent annual growth.



## A shortage of engineers will also challenge top-line growth

- While national unemployment was 3.5 percent in September, engineering unemployment was below 1.5 percent. We estimate that 82,000 additional engineers are needed in the U.S. for the work resulting from the federal IIJA funds.
- The labor shortage is reflected in hires versus job openings in the Professional and Business Services sector. For every new hire in this industry, there were 1.6 job openings.
- From our previous research on the benefits of technology tools in the Engineering and Design Services industry<sup>3</sup>, higher productivity was one of the top five benefits of technological tools. Technology and its associated productivity gains will play a major role in absorbing the blow from the current labor challenges.



## Supply chain disruptions improving but still a challenge for the construction industry

- Rising material costs and supply chain disruptions continue to plague the Engineering and Design Services industry as well as the industry's end markets. The graph below indicates the extent to which construction material prices have risen compared to the Consumer Price Index (i.e., inflation). Between late 2020 and early 2022, construction materials rose 30 percent while consumer inflation rose 7 percent. This year is bringing some relief with construction materials having dropped more than 26 percent since January 2022. Prices are now more in line with consumer inflation but still higher than historical averages for construction materials.

<sup>3</sup> The Future of Technology and Its Role in Engineering, October 2021

- The price of steel mill products was up 90 percent between 2020 and 2021. Steel mill prices in 2022 continue at nearly 32 percent higher than 2021. Builders' hardware showed less of an increase from 2020 to 2021 (8%), but the percent increase year-to-date in 2022 has nearly doubled (15%). Persistent inflation and supply chain issues indicate that overall construction materials will remain more expensive than in prior years.



Producer Price Index	2021/2020 Y/Y % change	2022/2021 YTD* Y/Y % change
Steel Mill Products	90.2%	31.7%
Metals- Iron & Steel	71.3%	24.4%
Plywood	46.2%	-3.0%
Softwood Lumber	41.2%	-2.4%
Hardwood Lumber	34.9%	13.7%
Gypsum	18.1%	20.7%
Builders' Hardware	8.3%	15.0%
Concrete	4.9%	12.1%

\*YTD = January through August

- The Global Supply Chain Pressure Index (GSCPI) tracks the state of global supply chains using data from the transportation and manufacturing sectors. This index shows the unprecedented impact of the pandemic on historical supply chain pressure. The GSCPI has now been falling since April 2022, indicating a slight release of supply chain pressure; however, it is still historically high.
- Much like the Engineering and Design Services industry, labor has been an issue in the construction industry. The number of job openings in the construction industry was rising steadily between April 2020 and April 2022. There was slight improvement in May and June of 2022, but job openings increased again in July of this year. These labor shortages are causing project delays and act as a headwind on A/E activity.



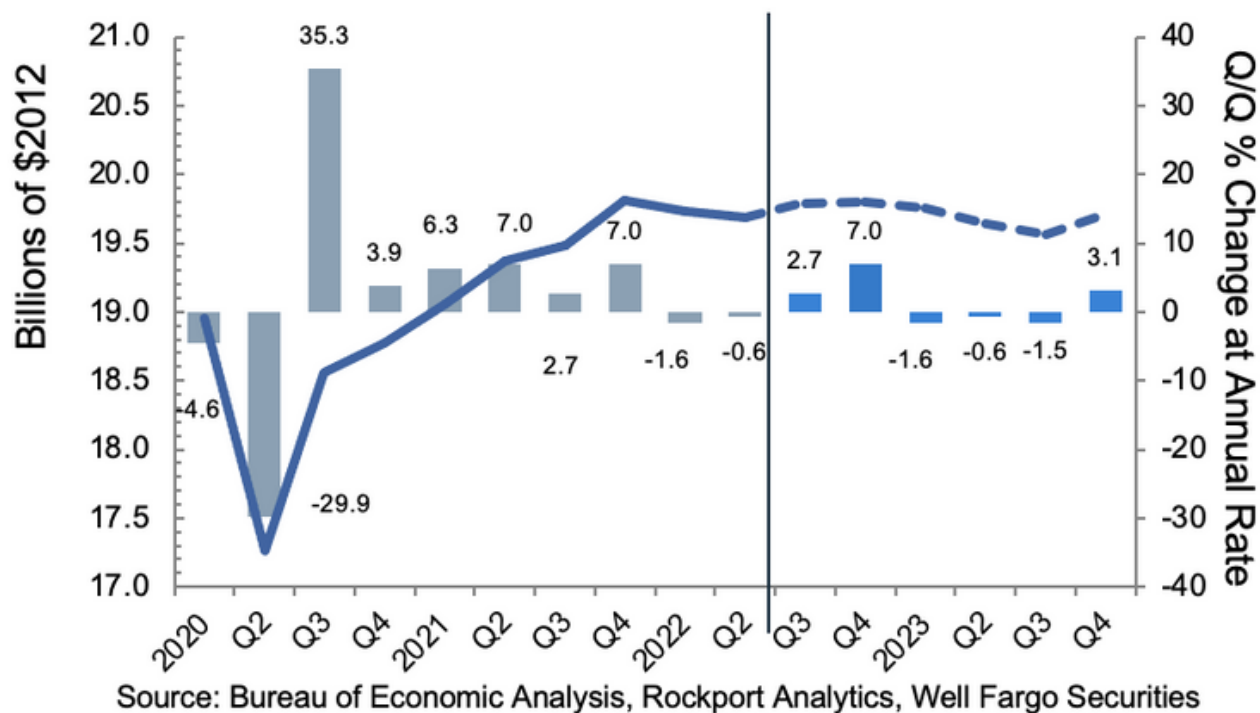


Rising interest rates will slow the recovery and risk driving the U.S. economy into recession

- U.S. GDP declined by an annualized rate of 1.6 percent in the first quarter of 2022. A smaller second quarter decline of 0.6 percent reflects an increase in exports and consumer spending. Persistent inflation, that continues to surprise to the upside, has led to an increasingly hawkish Federal Reserve. The Fed has raised the Federal Funds rate by an unprecedented 300 basis points thus far in 2022. The Fed is likely to continue to raise rates given the strong inflation report and a strong labor market. Given this tightening, our base case is for a mild recession in 2023. Under this scenario, A/E activity would certainly slow through the first half of 2023, but we think the industry tailwinds are strong enough to avoid recession in the A/E sector.
- While a mild recession in 2023 is our base case scenario, there is increasing risk for a more moderate or even severe recession should the Federal Reserve’s tightening regime go too far and drive the U.S. economy into a steeper decline. Significantly tighter financial conditions would put an outsized strain on construction and the demand for Engineering and Design Services, leading to a substantial contraction in the A/E sector in 2023.

Quarterly Percent Change in US GDP

History From 2020 Q1 and Forecast Through 2023 Q4



# APPENDIX I

## ECONOMIC IMPACT RESULTS BY STATE

### Engineering and Design Services Industry State-Level Impacts – Revenue

Engineering and Design Services Industry Revenue by State			
Revenue 2021 (in millions \$)			
State	2020	2021	Annual Growth
Alabama	\$6,488	\$7,139	10%
Alaska	\$919	\$954	4%
Arizona	\$5,560	\$6,393	15%
Arkansas	\$1,053	\$1,217	16%
California	\$47,940	\$53,023	11%
Colorado	\$12,171	\$13,740	13%
Connecticut	\$2,761	\$2,994	8%
Delaware	\$775	\$831	7%
District of Columbia	\$2,329	\$2,439	5%
Florida	\$17,612	\$20,255	15%
Georgia	\$9,227	\$10,396	13%
Hawaii	\$1,354	\$1,488	10%
Idaho	\$1,290	\$1,533	19%
Illinois	\$9,911	\$10,752	8%
Indiana	\$3,681	\$4,114	12%
Iowa	\$1,649	\$1,837	11%
Kansas	\$2,824	\$3,061	8%
Kentucky	\$2,359	\$2,694	14%
Louisiana	\$4,627	\$4,756	3%
Maine	\$1,045	\$1,149	10%
Maryland	\$9,614	\$10,122	5%
Massachusetts	\$12,081	\$12,686	5%
Michigan	\$19,954	\$22,652	14%
Minnesota	\$5,107	\$5,646	11%
Mississippi	\$909	\$1,030	13%
Missouri	\$5,017	\$5,529	10%
Montana	\$955	\$1,103	15%
Nebraska	\$1,415	\$1,583	12%
Nevada	\$2,516	\$2,767	10%
New Hampshire	\$1,645	\$1,970	20%
New Jersey	\$9,378	\$10,208	9%
New Mexico	\$1,653	\$1,805	9%
New York	\$17,831	\$18,914	6%
North Carolina	\$7,754	\$8,958	16%
North Dakota	\$926	\$812	-12%
Ohio	\$7,978	\$8,929	12%
Oklahoma	\$2,064	\$2,133	3%
Oregon	\$3,570	\$3,938	10%
Pennsylvania	\$12,183	\$13,186	8%
Rhode Island	\$795	\$853	7%
South Carolina	\$3,985	\$4,408	11%
South Dakota	\$558	\$628	13%
Tennessee	\$4,760	\$5,367	13%
Texas	\$40,059	\$42,777	7%
Utah	\$3,202	\$3,566	11%
Vermont	\$474	\$551	16%
Virginia	\$14,304	\$15,287	7%
Washington	\$7,914	\$8,616	9%
West Virginia	\$713	\$781	10%
Wisconsin	\$3,936	\$4,639	18%
Wyoming	\$378	\$392	4%
<b>U.S. TOTAL</b>	<b>\$339,200</b>	<b>\$372,600</b>	<b>10%</b>

Source: Rockport Analytics, Bureau of Labor Statistics

# APPENDIX I

## ECONOMIC IMPACT RESULTS BY STATE

### Engineering and Design Services Industry State-Level Impacts – Jobs Supported

State	Jobs Supported 2021			
	Direct Jobs	Indirect Jobs	Induced Jobs	Total Jobs
Alabama	29,035	16,977	34,576	80,588
Alaska	4,389	1,824	4,949	11,162
Arizona	29,155	29,778	38,691	97,624
Arkansas	6,777	3,044	7,797	17,617
California	186,757	161,833	238,025	586,615
Colorado	52,627	44,231	67,653	164,510
Connecticut	12,626	9,709	15,487	37,822
Delaware	3,608	2,089	4,156	9,854
District of Columbia	7,887	7,586	7,874	23,347
Florida	95,689	94,261	125,728	315,678
Georgia	45,053	46,833	60,920	152,806
Hawaii	6,218	3,910	7,569	17,697
Idaho	7,782	4,762	9,302	21,846
Illinois	46,681	42,172	62,113	150,967
Indiana	21,339	13,021	26,123	60,484
Iowa	8,197	5,030	9,594	22,820
Kansas	13,900	8,119	16,257	38,276
Kentucky	12,906	7,136	15,138	35,179
Louisiana	22,060	15,163	27,661	64,884
Maine	5,568	3,732	6,874	16,173
Maryland	40,694	32,702	50,622	124,017
Massachusetts	42,094	34,901	51,943	128,937
Michigan	86,483	52,773	104,832	244,088
Minnesota	23,753	17,121	29,164	70,038
Mississippi	5,776	2,758	6,716	15,250
Missouri	23,327	19,155	29,568	72,050
Montana	5,290	2,676	6,149	14,116
Nebraska	7,231	4,380	8,597	20,208
Nevada	12,784	11,281	15,824	39,890
New Hampshire	7,747	6,045	9,524	23,316
New Jersey	39,686	35,988	50,387	126,060
New Mexico	8,548	4,140	9,844	22,532
New York	73,402	70,475	90,384	234,261
North Carolina	42,661	38,008	56,359	137,028
North Dakota	4,004	1,644	4,501	10,149
Ohio	42,610	34,821	54,011	131,442
Oklahoma	11,443	8,261	13,974	33,678
Oregon	17,701	10,842	20,857	49,400
Pennsylvania	58,357	50,933	76,523	185,812
Rhode Island	4,201	2,988	5,067	12,256
South Carolina	20,736	13,829	25,589	60,154
South Dakota	3,256	1,426	3,783	8,465
Tennessee	23,507	17,824	30,210	71,542
Texas	162,960	149,714	222,393	535,066
Utah	17,480	16,169	22,432	56,081
Vermont	2,664	1,688	3,179	7,531
Virginia	57,365	49,058	71,548	177,971
Washington	34,841	20,213	40,540	95,594
West Virginia	4,429	1,932	4,986	11,347
Wisconsin	21,624	16,408	27,518	65,550
Wyoming	2,223	929	2,511	5,664
U.S. TOTAL	1,527,130	1,252,291	1,936,021	4,715,443

Source: Rockport Analytics, IMPLAN

# APPENDIX I

## ECONOMIC IMPACT RESULTS BY STATE

### Engineering and Design Services Industry State-Level Impacts – Wages Supported

State	Wages Supported 2021 (in millions \$)			
	Direct Wages	Indirect Wages	Induced Wages	Total Wages
Alabama	\$2,932	\$1,042	\$1,969	\$5,944
Alaska	\$392	\$117	\$251	\$760
Arizona	\$2,626	\$1,457	\$1,900	\$5,983
Arkansas	\$500	\$164	\$325	\$990
California	\$21,776	\$11,726	\$15,383	\$48,885
Colorado	\$5,643	\$3,264	\$4,174	\$13,081
Connecticut	\$1,229	\$493	\$814	\$2,537
Delaware	\$341	\$112	\$213	\$666
District of Columbia	\$1,002	\$377	\$519	\$1,898
Florida	\$8,319	\$4,250	\$5,970	\$18,539
Georgia	\$4,269	\$2,309	\$3,131	\$9,709
Hawaii	\$611	\$235	\$415	\$1,261
Idaho	\$630	\$249	\$425	\$1,304
Illinois	\$4,416	\$2,427	\$3,266	\$10,109
Indiana	\$1,690	\$673	\$1,169	\$3,531
Iowa	\$754	\$285	\$491	\$1,530
Kansas	\$1,257	\$526	\$838	\$2,622
Kentucky	\$1,106	\$404	\$735	\$2,246
Louisiana	\$1,953	\$708	\$1,319	\$3,981
Maine	\$472	\$174	\$319	\$965
Maryland	\$4,157	\$1,865	\$2,805	\$8,828
Massachusetts	\$5,210	\$2,537	\$3,513	\$11,260
Michigan	\$9,303	\$4,099	\$6,459	\$19,862
Minnesota	\$2,319	\$1,137	\$1,627	\$5,082
Mississippi	\$423	\$125	\$276	\$824
Missouri	\$2,271	\$1,042	\$1,579	\$4,892
Montana	\$453	\$142	\$295	\$891
Nebraska	\$650	\$249	\$430	\$1,330
Nevada	\$1,136	\$527	\$762	\$2,426
New Hampshire	\$809	\$358	\$539	\$1,706
New Jersey	\$4,192	\$2,323	\$2,959	\$9,474
New Mexico	\$741	\$238	\$481	\$1,461
New York	\$7,768	\$3,399	\$5,044	\$16,211
North Carolina	\$3,679	\$1,741	\$2,619	\$8,039
North Dakota	\$334	\$99	\$212	\$645
Ohio	\$3,667	\$1,812	\$2,616	\$8,094
Oklahoma	\$876	\$391	\$602	\$1,870
Oregon	\$1,617	\$744	\$1,099	\$3,461
Pennsylvania	\$5,416	\$2,527	\$3,811	\$11,753
Rhode Island	\$350	\$129	\$227	\$706
South Carolina	\$1,810	\$728	\$1,264	\$3,803
South Dakota	\$258	\$73	\$167	\$498
Tennessee	\$2,204	\$1,069	\$1,609	\$4,882
Texas	\$17,568	\$9,660	\$13,514	\$40,743
Utah	\$1,465	\$842	\$1,059	\$3,366
Vermont	\$226	\$75	\$146	\$447
Virginia	\$6,278	\$3,289	\$4,300	\$13,867
Washington	\$3,538	\$1,565	\$2,383	\$7,486
West Virginia	\$321	\$90	\$200	\$611
Wisconsin	\$1,905	\$778	\$1,306	\$3,989
Wyoming	\$161	\$43	\$101	\$305
U.S. TOTAL	\$153,025	\$74,689	\$107,636	\$335,350

Source: Rockport Analytics, IMPLAN

# APPENDIX I

## ECONOMIC IMPACT RESULTS BY STATE

### Engineering and Design Services Industry State-Level Impacts – Value-Added

Value-Added 2021 (in millions \$)				
State	Direct Value-Added	Indirect Value-Added	Induced Value-Added	Total Value-Added
Alabama	\$4,096	\$1,816	\$3,501	\$9,414
Alaska	\$552	\$210	\$398	\$1,161
Arizona	\$3,684	\$2,331	\$4,101	\$10,117
Arkansas	\$695	\$288	\$522	\$1,505
California	\$30,344	\$19,332	\$31,901	\$81,576
Colorado	\$7,871	\$5,268	\$9,402	\$22,540
Connecticut	\$1,728	\$840	\$1,410	\$3,978
Delaware	\$480	\$208	\$312	\$1,000
District of Columbia	\$1,428	\$643	\$203	\$2,273
Florida	\$11,691	\$6,957	\$12,670	\$31,317
Georgia	\$5,955	\$3,843	\$7,067	\$16,865
Hawaii	\$860	\$423	\$805	\$2,088
Idaho	\$878	\$418	\$751	\$2,047
Illinois	\$6,108	\$4,139	\$7,401	\$17,648
Indiana	\$2,341	\$1,175	\$2,247	\$5,764
Iowa	\$1,050	\$479	\$770	\$2,298
Kansas	\$1,746	\$932	\$1,518	\$4,195
Kentucky	\$1,532	\$706	\$1,267	\$3,504
Louisiana	\$2,727	\$1,187	\$2,326	\$6,240
Maine	\$663	\$283	\$561	\$1,507
Maryland	\$5,849	\$3,217	\$5,209	\$14,275
Massachusetts	\$7,307	\$4,340	\$6,577	\$18,224
Michigan	\$12,944	\$6,799	\$12,340	\$32,083
Minnesota	\$3,207	\$1,888	\$3,196	\$8,291
Mississippi	\$591	\$220	\$448	\$1,260
Missouri	\$3,146	\$1,830	\$3,208	\$8,184
Montana	\$636	\$250	\$476	\$1,361
Nebraska	\$908	\$420	\$736	\$2,063
Nevada	\$1,600	\$884	\$1,407	\$3,890
New Hampshire	\$1,137	\$519	\$833	\$2,488
New Jersey	\$5,841	\$3,891	\$6,121	\$15,853
New Mexico	\$1,040	\$407	\$761	\$2,208
New York	\$10,919	\$6,197	\$8,755	\$25,872
North Carolina	\$5,131	\$2,949	\$5,500	\$13,580
North Dakota	\$468	\$179	\$326	\$973
Ohio	\$5,061	\$2,976	\$5,284	\$13,321
Oklahoma	\$1,219	\$620	\$1,095	\$2,934
Oregon	\$2,259	\$1,256	\$2,072	\$5,587
Pennsylvania	\$7,507	\$4,223	\$7,548	\$19,278
Rhode Island	\$493	\$222	\$363	\$1,077
South Carolina	\$2,531	\$1,306	\$2,598	\$6,436
South Dakota	\$361	\$131	\$266	\$758
Tennessee	\$3,061	\$1,819	\$3,544	\$8,424
Texas	\$24,382	\$16,326	\$33,370	\$74,078
Utah	\$2,037	\$1,372	\$2,294	\$5,702
Vermont	\$317	\$127	\$225	\$669
Virginia	\$8,787	\$5,448	\$8,263	\$22,498
Washington	\$4,943	\$2,761	\$4,569	\$12,272
West Virginia	\$451	\$149	\$265	\$865
Wisconsin	\$2,636	\$1,298	\$2,382	\$6,315
Wyoming	\$227	\$78	\$147	\$452
U.S. TOTAL	\$213,422	\$125,576	\$219,309	\$558,307

Source: Rockport Analytics, IMPLAN



# APPENDIX I

## ECONOMIC IMPACT RESULTS BY STATE

### Engineering and Design Services Industry State-Level Impacts – Taxes

Taxes 2021 (in millions \$)			
State	Total Federal Taxes	Total State & Local Taxes	Total Taxes
Alabama	\$1,300	\$583	\$1,883
Alaska	\$160	\$57	\$218
Arizona	\$1,397	\$598	\$1,995
Arkansas	\$208	\$112	\$320
California	\$11,263	\$5,585	\$16,848
Colorado	\$3,112	\$1,438	\$4,550
Connecticut	\$549	\$326	\$875
Delaware	\$138	\$57	\$195
District of Columbia	\$314	\$98	\$411
Florida	\$4,324	\$1,840	\$6,164
Georgia	\$2,329	\$881	\$3,210
Hawaii	\$288	\$204	\$492
Idaho	\$283	\$137	\$420
Illinois	\$2,437	\$1,252	\$3,689
Indiana	\$796	\$365	\$1,161
Iowa	\$317	\$153	\$470
Kansas	\$579	\$273	\$852
Kentucky	\$484	\$239	\$723
Louisiana	\$862	\$405	\$1,266
Maine	\$208	\$142	\$350
Maryland	\$1,971	\$1,088	\$3,059
Massachusetts	\$2,516	\$1,188	\$3,704
Michigan	\$4,430	\$1,990	\$6,419
Minnesota	\$1,145	\$613	\$1,758
Mississippi	\$174	\$97	\$271
Missouri	\$1,130	\$452	\$1,582
Montana	\$188	\$96	\$283
Nebraska	\$285	\$128	\$413
Nevada	\$537	\$253	\$790
New Hampshire	\$343	\$149	\$493
New Jersey	\$2,189	\$1,342	\$3,530
New Mexico	\$305	\$177	\$481
New York	\$3,572	\$2,238	\$5,810
North Carolina	\$1,875	\$754	\$2,629
North Dakota	\$134	\$78	\$212
Ohio	\$1,839	\$838	\$2,677
Oklahoma	\$405	\$192	\$597
Oregon	\$771	\$376	\$1,148
Pennsylvania	\$2,662	\$1,341	\$4,003
Rhode Island	\$149	\$83	\$232
South Carolina	\$889	\$407	\$1,296
South Dakota	\$105	\$41	\$146
Tennessee	\$1,163	\$437	\$1,600
Texas	\$10,228	\$4,305	\$14,533
Utah	\$787	\$315	\$1,102
Vermont	\$92	\$62	\$154
Virginia	\$3,106	\$1,472	\$4,579
Washington	\$1,694	\$718	\$2,413
West Virginia	\$119	\$65	\$184
Wisconsin	\$872	\$432	\$1,304
Wyoming	\$62	\$29	\$91
U.S. TOTAL	\$77,085	\$36,501	\$113,585

Source: Rockport Analytics, IMPLAN, Bureau of Economic Analysis, Bureau of Labor Statistics, U.S. Census Bureau

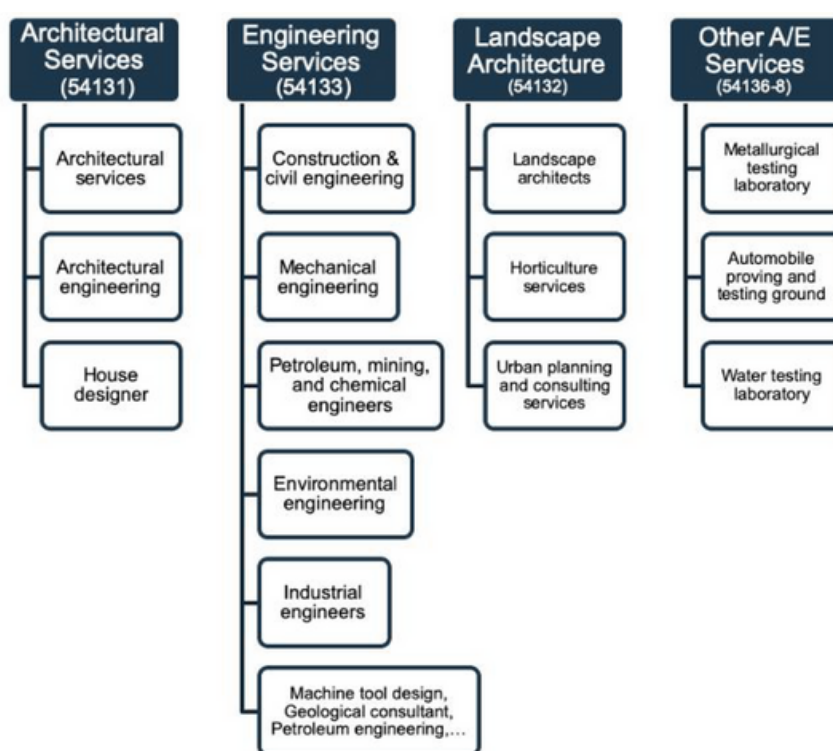
## APPENDIX II

# ENGINEERING AND DESIGN SERVICES INDUSTRY DEFINITION

The definition of the Engineering and Design Services industry has been primarily developed based upon the ways in which public and private data sources collect and publish information from all businesses across the U.S. – the North American Industry Classification System, or NAICS. NAICS is a hierarchical industry taxonomy that provides classification standards for businesses according to their stated activities. Most public and private data collection conforms to these standards.

The NAICS code “5413, Architectural, Engineering, and Related Services” is part of the broad category, “54 - Professional, Scientific, and Technical Services” and includes both private and public sector organizations from several sub-sectors including:

- Architectural Services
- Landscape Architectural Services
- Engineering Services
- Drafting Services
- Building Inspection Services
- Geophysical Surveying and Mapping Services
- Surveying and Mapping (except Geophysical) Services
- Testing Laboratories



This study will focus on the all-inclusive NAICS 5413 category to define Engineering and Design Services activity for several reasons:

- More data with higher frequencies and greater regional detail are available at the 4-digit (5413) NAICS level. The deeper we drill into the NAICS structure, the less available and robust the data describing sector performance.
- Second, as a result of mergers and/or vertical integration strategies, more and more traditional ACEC members do operate across many of the sub-sectors within 5413.

## APPENDIX II

# ENGINEERING AND DESIGN SERVICES INDUSTRY DEFINITION

- Third, given the economic and policy drivers of the Engineering and Design Services industry, it is likely that measured trends for NAICS 5413 will hold for most, if not all, of its member sub-sectors.
- Finally, a broader definition of A/E may bring more potential members into the ACEC family.

One important note regarding the analysis and interpretation of the results in this study. Our focus on NAICS 5413 in its entirety is not perfectly representative of board licensed professionals providing engineering services for the built environment (physical infrastructure) and the firms for which they work. Such firms are notable and different for several reasons, including:

- Professional licensure creates direct moral and liability considerations for the licensed professional and their firms, regarding the safety and health of people and property.
- Federal, state, and local governments have laws and statutes which provide for separate procurement processes that involve the selection of providers of licensed professional and related services based on capability and experience criteria.
- Services can only be provided in disciplines (civil, mechanical, electrical, structural, environmental, etc.) the professionals are qualified to perform, and in many states, firm ownership is required to consist of all or a certain percentage of active professionals in the firm. This has the effect of also limiting the size of many such firms.
- Design work usually requires the teaming of firms with varied discipline capabilities and experience.
- Board licensing is for individual states or territories, resulting in geographical emphasis or limits on where work can be performed by individual firms.
- Since built environment involves facilities and infrastructure that are unique, due to the physical conditions involved, their designs must be correct when complete. Prototypes and beta testing are not an option since the initial construction costs and later corrections are prohibitive. The designs must be right the first time.

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Since the definitions of NAICS Code 5413 and 541330 do not distinguish design of built environment from the design of equipment, systems, materials, instruments, software, and similar repeatable products and most data gathering surveys and processes allow for self-determination of NAICS Code reporting, many manufacturing, industrial, and management firms are included in the results. Often these are large enterprises that may skew the results.

While these firms may be “applying physical laws and principles of engineering in their design work”, they are essentially operating in a different business sector of the A/E industry. ACEC represents the business interests of firms across all NAICS Code 5413, but recognizes the difference involved. We have attempted to provide context and insight where we have evidence that the more relevant data might deviate from the broader findings.

It must be emphasized that while the data contained in this report is suitable for many purposes, including understanding the size and impact of the A/E services industry, the data available and presented is not suitable for evaluating and establishing guidance for decisions on procurement practices or developing size standards for either the aggregate industry or the portion of the industry focused on design of the built environment. The latter portion is heavily concentrated in physical infrastructure design services provided to federal, state, and local governments and entities involved in public works. The firms operating in this sector of the A/E services industry make up the largest portion of ACEC membership.

### The 2022 – 2027 Engineering Industry Forecast Methodology

The foundation for the forecast for Engineering and Design Services includes the historical trends of sector-level industry revenue that were established in earlier phases of research. The goal of this phase of research is to:

- (1) update the previous quantitative forecast for Engineering and Design Services activity over the next five years
- (2) provide context around the key drivers of the forecast for Engineering and Design Services
- (3) analyze key trends, risks, and opportunities

The Engineering and Design Services industry forecast is developed by analyzing historical correlations between key driver variables of A/E services with overall A/E industry revenue. Using these mathematical correlations allows us to make inferences around the direction of Engineering and Design Services activity in the future. The forecast is further informed by quantitative data and industry insight to account for additional factors that may not be included in the econometric model.

## APPENDIX II

# ENGINEERING AND DESIGN SERVICES INDUSTRY DEFINITION

### The 2022 – 2027 Engineering Industry Forecast Data Sources

The data-driven effort to profile the Engineering and Design Services industry took advantage of a comprehensive set of published data from several public and private sources including:

- U.S. Census Bureau - Statistics of U.S. Business (SUBS) - demographics, housing, income, employment and business establishment data and trends
- U.S. Census Bureau - Value of Construction Put in Place
- U.S. Census Bureau – Quarterly Services Survey (QSS)
- U.S. Bureau of Labor Statistics (BLS) - industry employment and earnings plus occupational employment and annual salary statistics
- U.S. Bureau of Economic Analysis (BEA) - National Income and Product Accounts (GDP), employment, sales, wages, and supply chain purchases
- Dodge Data and Analytics - commercial construction project data
- Other public and private sources



## APPENDIX III

# ABOUT ACEC RESEARCH INSTITUTE & ROCKPORT ANALYTICS

## ABOUT ACEC RESEARCH INSTITUTE

The ACEC Research Institute's mission is to deliver knowledge and business strategies that guide and elevate the engineering industry and to be the leading source of knowledge and thought leadership for creating a more sustainable, safe, secure, and technically advanced built environment. The ACEC Research Institute is an independent 501c3 nonprofit organization.

## ABOUT ROCKPORT ANALYTICS

Rockport Analytics is a research and analytical consulting firm providing high quality quantitative and qualitative research solutions to business, government, and non-profit organization clients across the globe. We provide fast, nimble service in a completely transparent environment. Capabilities include:

- Industry/Market Analysis and Forecasting
- Economic Impact Assessment and Economic Development
- Market Modeling and Decision Support Tools
- Project Feasibility Assessment
- Primary and Secondary Research Synthesis

# THANK YOU

The ACEC Research Institute provides the engineering industry with cutting edge research, trend data, and economic analysis to help firm owners make decisions and delivers thought leadership that advances engineering's essential value to society.

**The ACEC Research Institute wishes to extend its sincere appreciation to its generous contributors.**

*As of October 2022*

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