2021

ECONOMIC ASSESSMENT OF THE ENGINEERING AND DESIGN SERVICES INDUSTRY

REVIEW OF 2020 INDUSTRY PERFORMANCE & 2022-2026 INDUSTRY FORECAST

NOVEMBER 2021

ACEC RESEARCH INSTITUTE

2021 ECONOMIC ASSESSMENT OF THE ENGINEERING AND DESIGN SERVICES INDUSTRY

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OVERVIEW

Introduction

This is the second annual release of this Engineering and Design Services industry forecast. In 2020, the ACEC Research Institute 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 part of that series which aims to describe, measure, and demonstrate the indispensable 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 highways, 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:

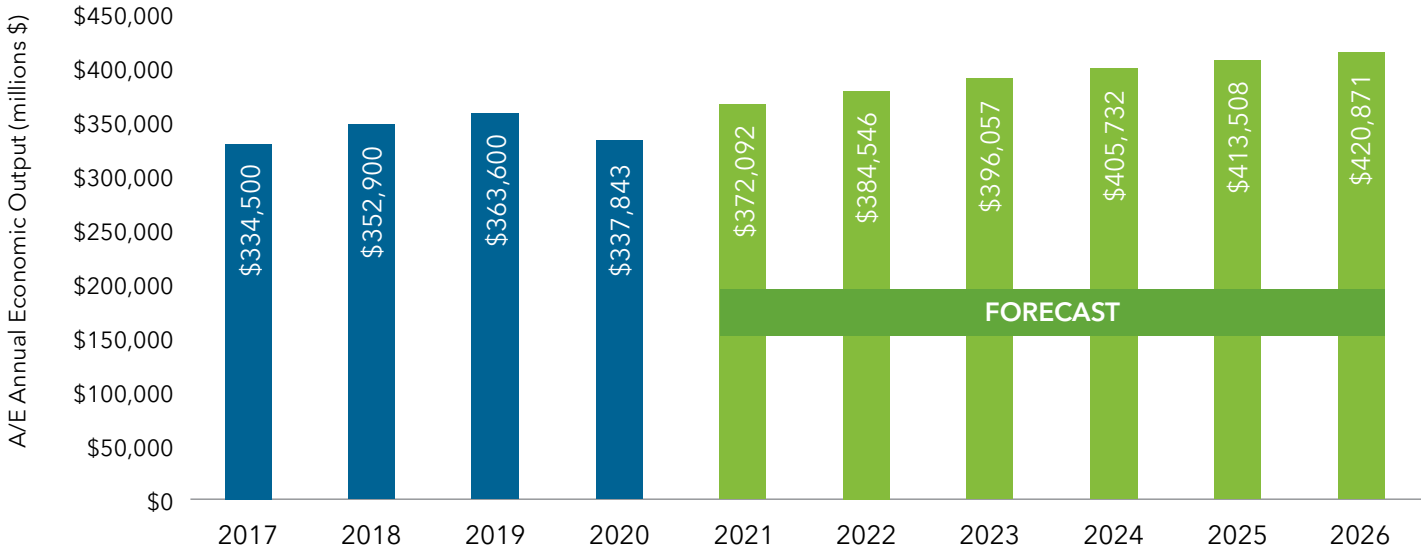
- Build on the previously defined Engineering and Design Services sector by updating published recurring data and tracking performance for ACEC's many constituencies.
- Provide a comprehensive view of the size, growth, and composition of the engineering and related professional services sector using 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.
- This report focuses on analyzing the key economic drivers of the Engineering and Design Services sector, using a statistical model with the strongest correlations between Engineering and Design Services performance and those drivers, and our updated recurring industry outlook. The outlook and modeling assets can be used to forecast future Engineering and Design Services performance 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.

SUMMARY OF FINDINGS

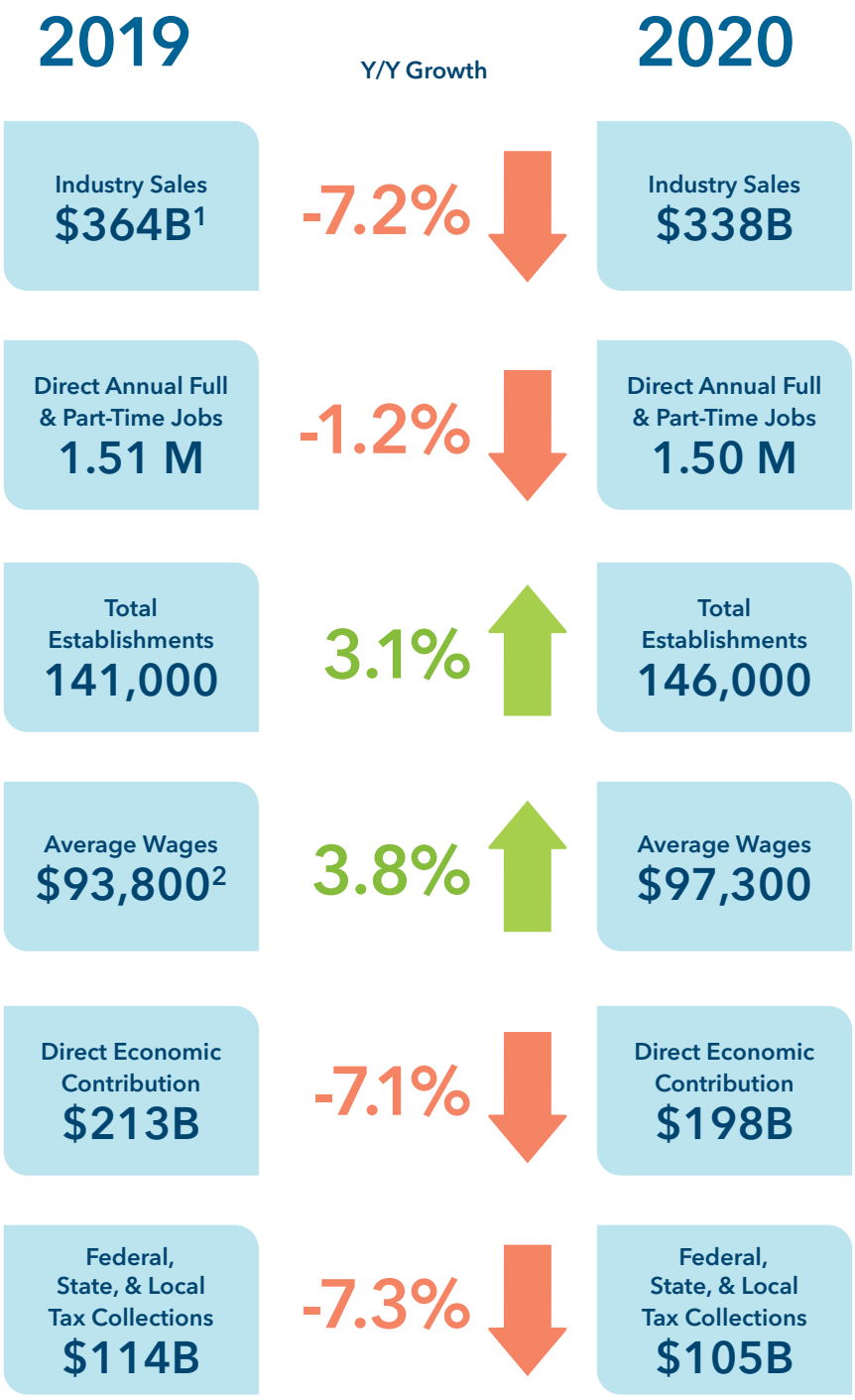
Key Takeaways

- As a result of the 2020 Great Lockdown and subsequent project postponements and cancelations, Engineering and Design Services Output fell an estimated 7.2% in 2020, significantly underperforming the broader US economy over the period.
- We expect total Engineering and Design Services industry to completely recover in 2021, growing 8.1% over 2021. We expect annual growth in Engineering and Design Services to remain in the 3% range from 2022 – 2023, before tailing off slightly in 2024 and 2025.
- Engineering and Design Services employment had a much shallower decline in 2020 than that of economic output, supported by PPP funding and the expectation of rapid recovery in the sector. Demand remains high for skilled workers, while the workforce is shrinking, applying additional upward pressure to industry wages, which were up 3.8% in 2020 and continue to rise.
- There are numerous near-term headwinds to our forecast including potential pandemic surges causing project delays or shutdowns, continued supply chain disruptions causing lack of material availability and increasing material prices, and the aforementioned labor shortage challenges.
- Construction remains mixed by market and segment. Residential construction continues to significantly outpace non-residential and non-building construction in 2021. Laggards include hotel, office and recreation and leisure. Bright spots include warehouses and data center construction. Regional activity shifted as well in 2021, driven by regional surges in the virus and their associated impacts. We expect activity to return to the longer-term secular trend over the forecast horizon with outperformance in the Sunbelt and coastal areas. The pandemic is likely to accelerate the movement from high to low cost of living regions of the country.
- Our baseline forecast does not include the potential for the passage of an infrastructure bill which would significantly improve the prospects over the next five years, adding a total of $132 billion in economic output through 2025.

Engineering and Design Services Economic Output in the United States: History & Forecast (2017-2026)



THE ENGINEERING AND DESIGN SERVICES SECTOR 2019 VS. 2020: BY THE NUMBERS



1 BEA updated 2019 revenue number

2 BLS updated 2019 wages

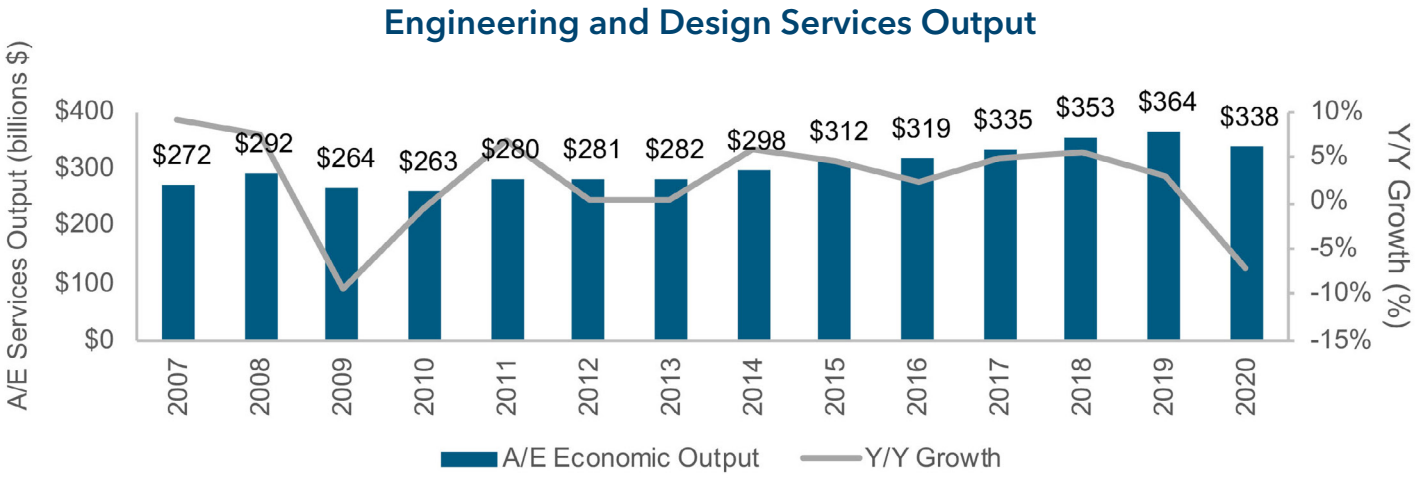
Bureau of Economic Analysis, Quarterly Census of Employment and Wages, Bureau of Labor Statistics, IMPLAN, Rockport Analytics

OVERVIEW OF INDUSTRY PERFORMANCE IN 2020

Engineering and Design Services Industry Challenged By the COVID-19 Pandemic

Like most industries in the U.S. during the Great Lockdown, the Engineering and Design Services sector was forced to make sudden, unexpected changes to their work practices. Offices were closed and employees and project teams had to figure out how to communicate and collaborate in the "new normal."

- Many projects came to a halt over the period. A September 2020 report by the Associated General Contractors of America cited 60% of architecture firms reported having at least one project that was postponed or canceled because of the coronavirus, and 33% reported having projects that were already underway halted because of the pandemic. In the same study, it was noted that productivity was also affected with 44% of firms saying that it was taking longer to complete projects, and 32% say it was costing more to complete ongoing projects because of the pandemic.
- These disruptions led to a decline in industry output of 7.2% in 2020, with Engineering and Design Services performing significantly worse than overall construction, which grew 5.6% [1] over 2020 and the broader US economy which declined by 2.9% .[2]
- It's not surprising to see Engineering and Design follow this trend as the engineering and design function within a project tends to take place early in its lifecycle. Our past research shows a typical lead relationship of Engineering and Design Services to broader construction activity anywhere from one to four quarters with the strongest correlation at a two-quarter lead.
- Employment in the sector was not hit nearly as hard as sales or industry output, falling only 1.2% to an annual average of 1.496 million jobs. This trend was likely driven by the expectation that the impact to firms' top-lines were transitory. Employment levels in 2020 were also supported by PPP funding, which incentivized and supported Engineering and Design Services firms in maintaining their workforces.
- Furthermore, there was upward pressure put on wages over the period. Gains were seen in total establishments and wages with the average industry wage growing 3.8% from $93,800 in 2019 to $97,300 in 2020. This compares to an average national wage of $64,200 in 2020, which was up 8.5% over 2019 averages.

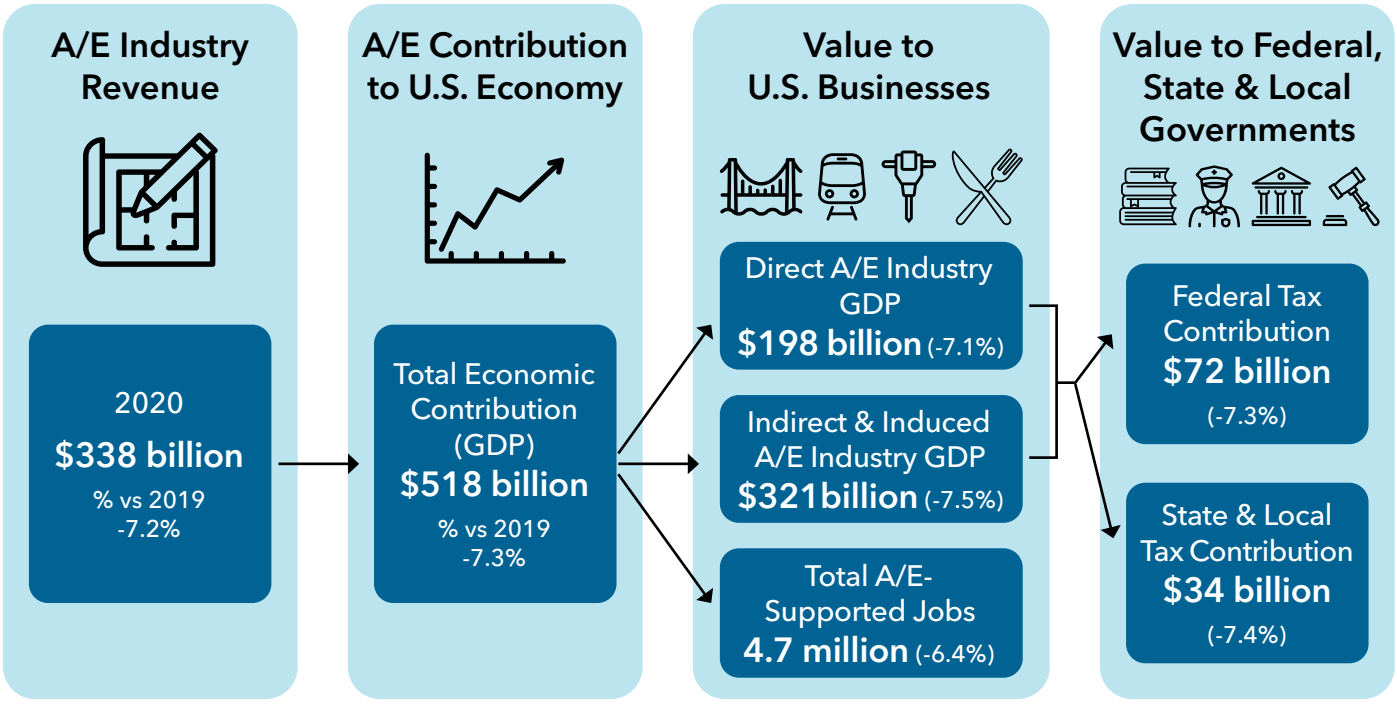


1 U.S. Census Bureau, Value of Construction Put in Place

2 U.S. Bureau of Economic Analysis (BEA)

SUMMARY OF 2020 ECONOMIC IMPACT

Last year's revenue decline led to an even more significant drop in the Engineering and Design Services industry's economic contribution. Down by 7.3% from 2019, Engineering and Design Services' total contribution to U.S. GDP reached just $518 billion in 2020.



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

- Engineering and Design Services Industry direct GDP fell to $198 billion in 2020, down 7.1% from the previous year. Meanwhile, as Engineering and Design Services firms sought to control material and supply costs in the wake of falling revenue, the industry's indirect contribution to GDP fell by 7.9% in 2020. Combined with the induced impact's decline of 7.3%, the upstream and downstream contribution of the Engineering and Design Services sector reached only $321 billion last year. Industry GDP falling faster than revenue is also indicative of falling profits.
- There was better news on the job and wage front, however. Engineering and Design Services industry direct employment fell by only 1.2% in 2020 to just short of 1.5 million jobs. Upstream (indirect) and downstream (induced) jobs supported by A/E activity fell more significantly, however, down by 8.9% and 8.5%, respectively. Overall Engineering and Design Services industry-supported jobs reached 4.7 million in 2020, down 6.4% versus year-earlier levels.

- Engineering and Design Services industry-initiated wages defied the downward slide in revenue and GDP, however. Engineering and Design Services industry-initiated wages reached $319 billion, up nearly 2% from 2019. Engineering and Design Services firms increased direct wages, including both full and part-time workers, by an average of 2.5%, as they looked towards recovery and sought to retain skilled workers. The industry's supply chain firms also increased wages, albeit it at a slightly softer pace (+0.8%).
- The Engineering and Design Services industry's contribution to federal, state, and local taxes was also constrained by the pandemic. A/E-initiated total tax receipts were $105 billion, down 7.3% from the year before. Federal taxes generated by Engineering and Design Services industry activity reached nearly $72 billion, while the state and local tax contribution fell to $34 billion.

2020 Engineering & Design Services Industry Bottom Line

For the U.S. Economy in billions of $ unless otherwise noted	**Direct**	**Indirect** (Supply Chain)	**Induced** (Supply Chain)	**Total**	**% vs 2019**
Total Industry Revenue				**$337.8**	**-7.2%**
Total Economic Contribution					
Total Economic Output/Sales	$337.8	$210.3	$364.6	**$912.7**	**-7.3%**
A/E Contribution to GDP	$197.5	$117.1	$203.5	**$518.1**	**-7.3%**
Jobs Supported (Full & Part-Time, in thousands)	1,496.2	1,182.9	2,033.3	**4,712.4**	**-6.4%**
Contribution to Payrolls	$145.6	$71.1	$102.4	**$319.0**	**1.9%**
Total Tax Receipts (in billions)	$38.5	$23.3	$43.6	**$105.4**	**-7.3%**
Federal	$31.2	$15.8	$24.5	**$71.5**	**-7.3%**
State & Local	$7.3	$7.5	$19.1	**$33.9**	**-7.4%**

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

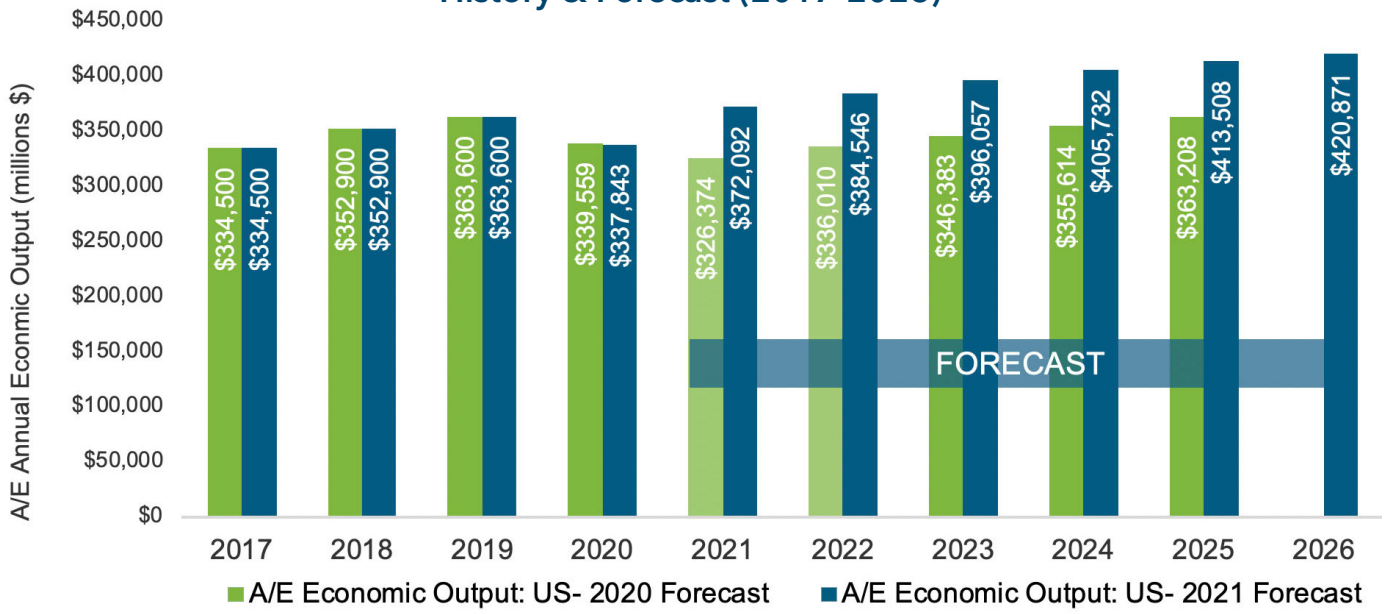
LOOKING AT 2021 AND BEYOND

Engineering and Design Services Activity Set to Grow 8.1% in 2021, More Modestly Through 2026

The pandemic-driven 2020 recession was the sharpest and shortest contraction in U.S. history, technically lasting only two months. Both fiscal and monetary stimulus helped to support households and businesses during the shutdown and economic re-opening. While immense challenges remain in 2021, the US economy is benefiting from rising levels of employment and wages, healthy household balance sheets, rebounding corporate profits and expected annual U.S. GDP growth in the range of 6%. The Engineering and Design Services sector has also bounced back much quicker than expected, resulting in an upgrade to our forecast from 2020.

- The historical economic output estimates have been revised from last year to incorporate BEA data revisions.
- We estimate that economic output in Engineering and Design Services fell 7% in 2020 to $338 billion from its historic peak of $364 billion in 2019. This was in line with our forecast in our fall 2020 outlook.
- We expect Engineering and Design Services Output to grow to $372 billion in 2021, up 8.1% compared to 2020, and surpass 2019 pre-pandemic numbers. This is a significantly brighter outcome than the originally planned negative growth for 2021. It is expected to continue to grow to nearly $385 billion in 2022 and surpass $420 billion by 2026.
- We expect growth to slow through the forecast horizon from 3.2% in 2022 to 1.8% by 2026 as rising interest rates, inflation, public debt levels and other headwinds to construction take their toll on growth.
- A ratified infrastructure bill would significantly change the trajectory of our forecast (more detail on page 15).

Engineering and Design Services Economic Output in the United States: History & Forecast (2017-2026)



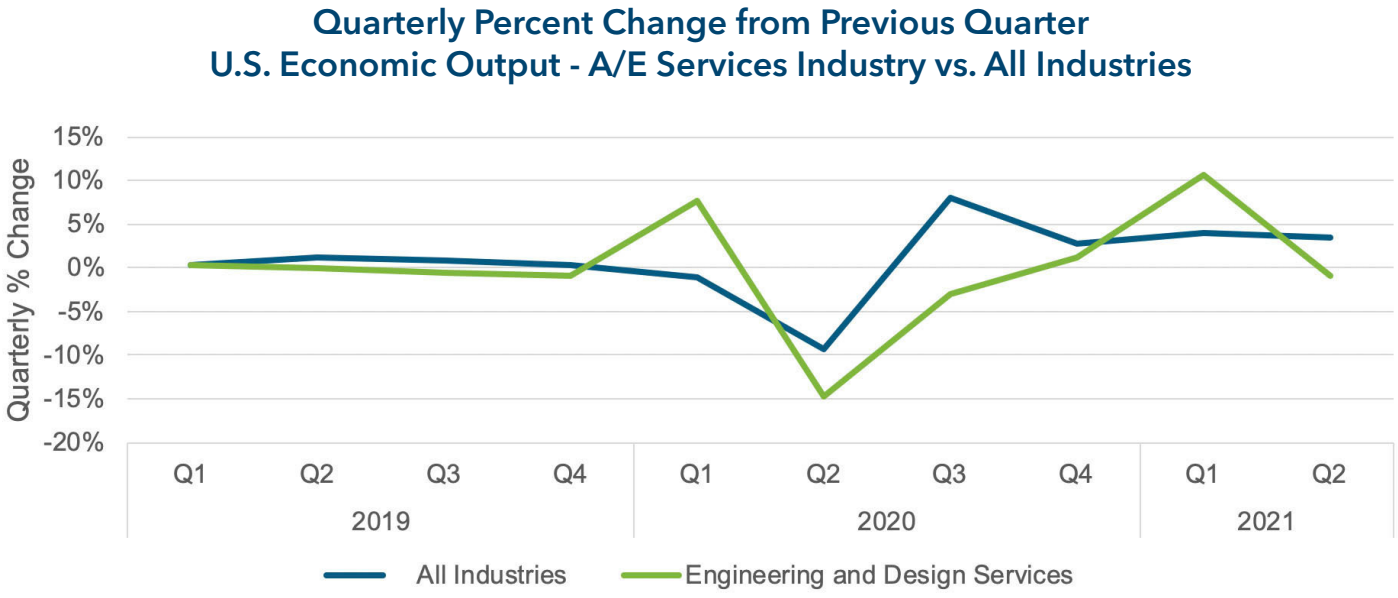
Forecast Comparisons	2021	2022	2023	2024	2025	2026
Annual Growth (2021 Forecast)	8.1%	3.2%	3.0%	2.4%	1.9%	1.8%
Annual Growth (2020 Forecast)	-3.9%	3.0%	3.1%	2.7%	2.1%	

ENGINEERING AND DESIGN SERVICES SNAPS BACK SHARPLY IN EARLY 2021

Engineering and Design Services significantly underperformed the broader economy in 2020, declining 7.2% from 2019 levels. These declines were driven by the rolling economic shutdowns at the national and state levels and significant project delays and disruptions.

We finally witnessed a reversal of trend in early 2021:

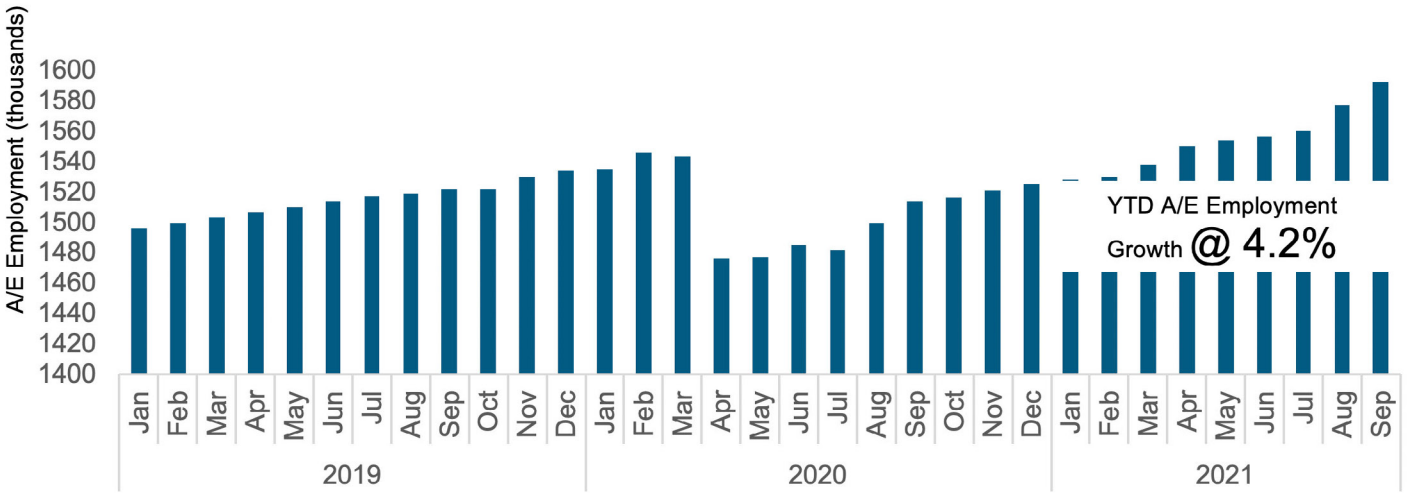
- Engineering and Design Services experienced a snapback in the first quarter, surging over 10% on a quarter-over-quarter basis. While Q2 was not quite as robust as Q1, it represented 12% growth on an annual basis.
- The rebound has been driven by the re-starting of projects and pent-up demand for Engineering and Design Services. Further fueling the rebound has been out-performance in many key Engineering and Design Services end-markets including manufacturing, transportation and residential real estate.
- Compared with the same quarter in 2019 (pre-pandemic), Q1 2021 was up 2% and Q2 was up 1%. We expect the industry will exceed its 2019 annual peak in 2021.
- We do, however, expect deceleration in the back half of this year as the COVID resurgence encumbers the recovery. We are also keeping our eye on a number of key risks (covered in greater detail on page 13) including: labor shortages, continued pricing pressure on construction inputs, rising interest rates and an oversupply of buildings (particularly, office, hotels and retail) in some markets.



Bureau of Economic Analysis, US Census Bureau, Rockport Analytics

- Engineering and Design Services employment has also been extraordinarily resilient, declining only 1.2% last year and already growing by 4.2% YTD as of September 2021. We expect this resiliency to continue but labor conditions in the sector are extremely tight. As of September 2021, the unemployment rate in professional and technical services is only 2.5%.

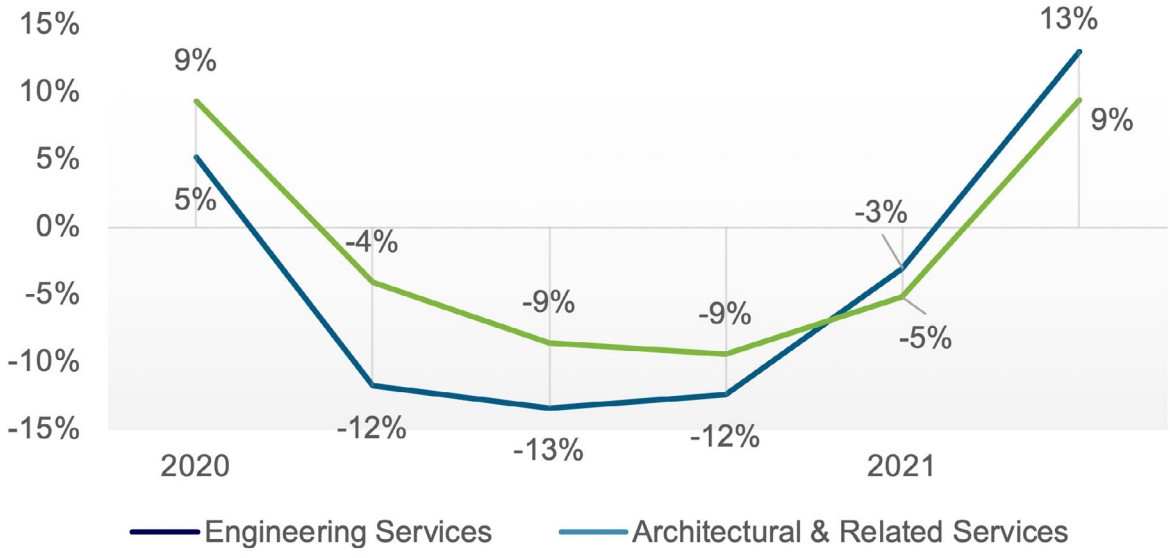
Engineering and Design Services Employment
January 2019 - September 2021



U.S. Bureau of Labor Statistics, Federal Reserve Economic Data (seasonally adjusted), Rockport Analytics

- Revenue in both Engineering and Design Services witnessed year-over-year declines from 2020 Q2 through 2021 Q1. The declines were significantly steeper in Engineering Services while the recovery has been much more rapid than that of Architectural Services.

Engineering Services vs. Architectural & Related Services - Y/Y Growth in Revenue



CONSTRUCTION PERFORMANCE IS MIXED ACROSS MARKETS AND SEGMENTS

Residential, Warehouse and Data Center Construction Bright Spots in 2021

- As noted in our previous research[3] Engineering and Design Services activity tends to be a leading indicator of construction activity, particularly non-residential and non-building construction. This relationship is apparent when analyzing relative performance in 2021. On a year-to-date basis non-residential construction put in place has declined 6% while Engineering and Design Services output is up nearly double digits. This decline in construction activity follows the 7% annual decline in Engineering and Design Services in 2020 (a period when construction put in place declined only 1%.)
- Residential construction has been a huge bright spot driven by record low interest rates, restrained housing supplies, increased demand from millennial household formation (12.3 million net new households since 2012), and imbalances due to shifting geographic trends. Residential construction put in place grew 15.3% in 2020 and another 20.4% on a YTD basis through August 2021.
- The rapid growth in e-commerce has kicked into an even higher gear during the pandemic, fueling demand for warehouse and distribution facilities. This trend has been further ignited by many firms shifting from just-in-time inventory to just-in-case inventory models to avoid the product shortages experienced in 2020 and increase their reserve stock as a hedge against supply chain disruptions. We expect the e-commerce trend to continue over the coming years as rapid adoption by more and more households and businesses is likely to be sticky even as the economy normalizes.
- We see continued pressure on retail, lodging, and office construction in 2021. While the "great reopening" has provided some support for these segments, it will likely be years to work through the supply-demand imbalances. And while we expect lodging demand to return to pre-pandemic levels through our forecast period, there are more secular shifts occurring that could impact the long-term demand for office space and retail centers.

3 2021-2025 Engineering Industry Forecast, ACEC Research Institute, February 2021

Value of Construction Put in Place: Non-building, Non-Residential & Commercial, and Residential 2019-2021					
Billions ($)	2019	2020	2020-2019 Y/Y%	2021*	2021-2020 Y/Y%
Non-Building	**$269**	**$269**	**0.0%**	**$266**	**-1.2%**
Water Supply Systems	$16	$19	14.2%	$19	-0.8%
Sewage & Waste Disposal	$26	$26	1.0%	$27	3.1%
Streets and Highways	$99	$100	0.5%	$98	-2.3%
Power Plants/Pipeline/Communications	$118	$115	-2.5%	$115	-0.3%
Total Conservation and Development	$9	$9	-2.7%	$8	-15.4%
Non-Residential & Commercial	**$569**	**$562**	**-1.1%**	**$528**	**-6.0%**
Office	$89	$87	-1.5%	$81	-7.4%
Communication	$22	$23	1.5%	$22	-3.1%
Transportation	$57	$60	3.9%	$56	-5.4%
Public safety	$12	$18	48.8%	$13	-27.8%
Lodging	$33	$29	-13.2%	$21	-27.0%
Educational	$109	$107	-1.4%	$99	-8.1%
Amusement and recreation	$30	$28	-9.4%	$25	-9.5%
Manufacturing	$81	$72	-10.9%	$73	1.6%
Health care	$46	$48	4.0%	$48	-0.6%
Religious	$4	$4	-6 2%	$3	-11.7%
Commercial	$84	$87	2.9%	$87	0.3%
Residential	**$553**	**$638**	**15.3%**	**$768**	**20.4%**
Total Put in Place	**$1,391**	**$1,469**	**5.6%**	**$1,562**	**6.3%**

Source: US Census Bureau Seasonally Adjusted Construction Spending, Rockport Analysis
*2021 based on January – August where August is "preliminary"

The value of U.S. construction starts reached $1.47 trillion in 2020 growing 5.6%. In the first eight months of 2021, the average monthly value is $1.56 trillion.

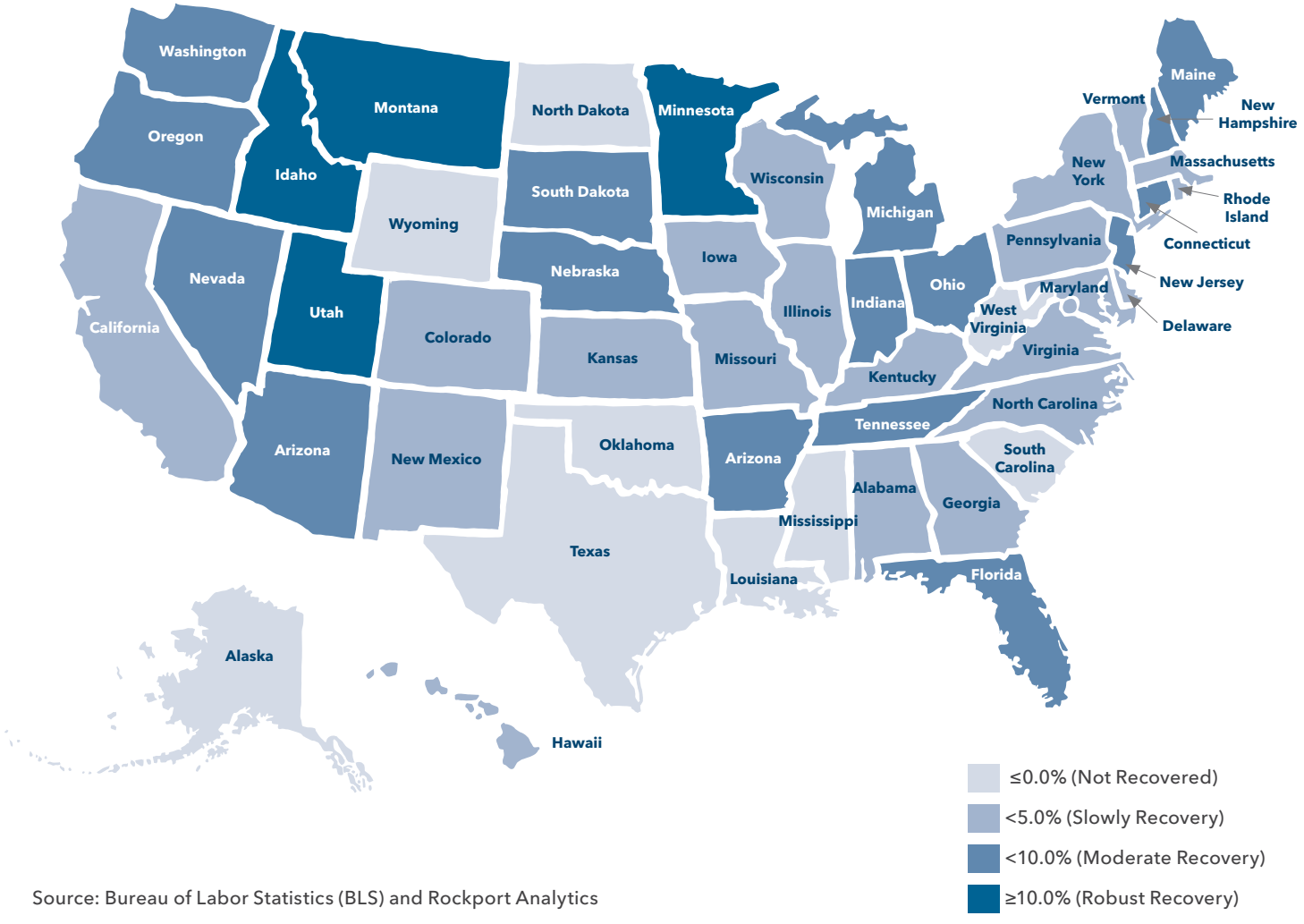
Non-building construction was flat between 2019 and 2020 and declined 1.2% in the first eight months of 2021. The only category showing growth in 2021 is sewage and waste disposal.

Non-residential construction declined 1.1% in 2020 and another 6.0% in the first eight months of 2021. The only categories showing growth in 2021 are manufacturing and commercial.

Residential construction rose 15.3% in 2020 and 20.4% in the first eight months of 2021. The residential housing shortage existed before the pandemic but has increased as people move from cities to more spacious suburbs.

Demographic Trends Continue to Impact Construction and Engineering and Design Services Activity

- We have witnessed significant shifts in performance within the construction sector since the fourth quarter of 2019 as indicated in the map below. The map illustrates the path of the recovery in construction activity since the start of the pandemic. As of Q2 2021, 41 states are above their pre-pandemic levels of construction activity. Those experiencing a robust recovery include Idaho, Montana, Utah and Minnesota. Other western states including Washington, Oregon, Nevada and Arizona have also performed well. The majority of states have moderately recovered since the start of the pandemic with current levels of construction activity five-to-ten percent above 2019 Q4 levels. The laggards include Texas, Louisiana, Mississippi, Wyoming, South Carolina and West Virginia. Construction activity has been hit hard by significant spikes in COVID cases throughout these states in 2021.
- As we work further towards recovery from the pandemic, we expect the prevailing demographic trends to return and dictate the geographic shifts in construction activity. The sunbelt states are likely to return to their former growth trajectory, favored over the mid-Atlantic, Northeast and Pacific markets given their lower costs of living and shifting lifestyle preferences. Economists and demographers expect the migration to intensify as many offices continue their transition into permanent work-from-home arrangements.



Source: Bureau of Labor Statistics (BLS) and Rockport Analytics

Key Forecast Risks and Upside Potential

Further pandemic-related project delays or shutdowns

- The COVID-19 pandemic significantly impacted, Engineering and Design Services performance in 2020 but the decline in cases coupled with the economic re-opening in early 2021 helped to fuel recovery in the sector. The spike brought on by the Delta variant, with cases surging in late summer 2021, have again pushed back the recovery in economic activity. Fortunately, we have seen a retrenchment of cases. As of mid-October, daily case counts are down 114% from their early-September peak and continue their decline. This resurgence, however, is a reminder that there is still possibility of further impacts from the pandemic on industry performance and recovery.

UNITED STATES

New cases confirmed each day (7-day-average) ▼ DOWN

The first case of COVID-19 in United States was reported 678 days ago on 1/21/2020. Since then, the country has reported 48,554,890 cases, and 780,140 deaths.

Supply chain disruptions continue to wreak havoc on input prices and availability

- The supply chain issues that arose during the COVID-19 pandemic have not disappeared. Many projects are experiencing delays because materials are not available. Supply shortages have of course also put upward pressure on prices. The overall producer price index (PPI) for final demand increased 8.3% year-over-year in the period ending August 2021, the largest advance since 12-month data were first calculated in November 2010.
- We expect supply chain issues to continue for at least another year. We are finally seeing some relief for lumber prices, which dropped to $399 per thousand board feet by August 2021, down from $1515 in May 2021. These prices, however, are still significantly higher than pre-pandemic levels (38%) and price fluctuations remain volatile. While lumber increases have begun to subside, steel mill products prices have been rising rapidly since August 2020, up 123% on a year-over-year basis. We expect to see relatively fewer projects take place and a continuing tightening of margins for Architectural, Engineering and Construction (AEC) firms until the global economy works through these supply chain disruptions.

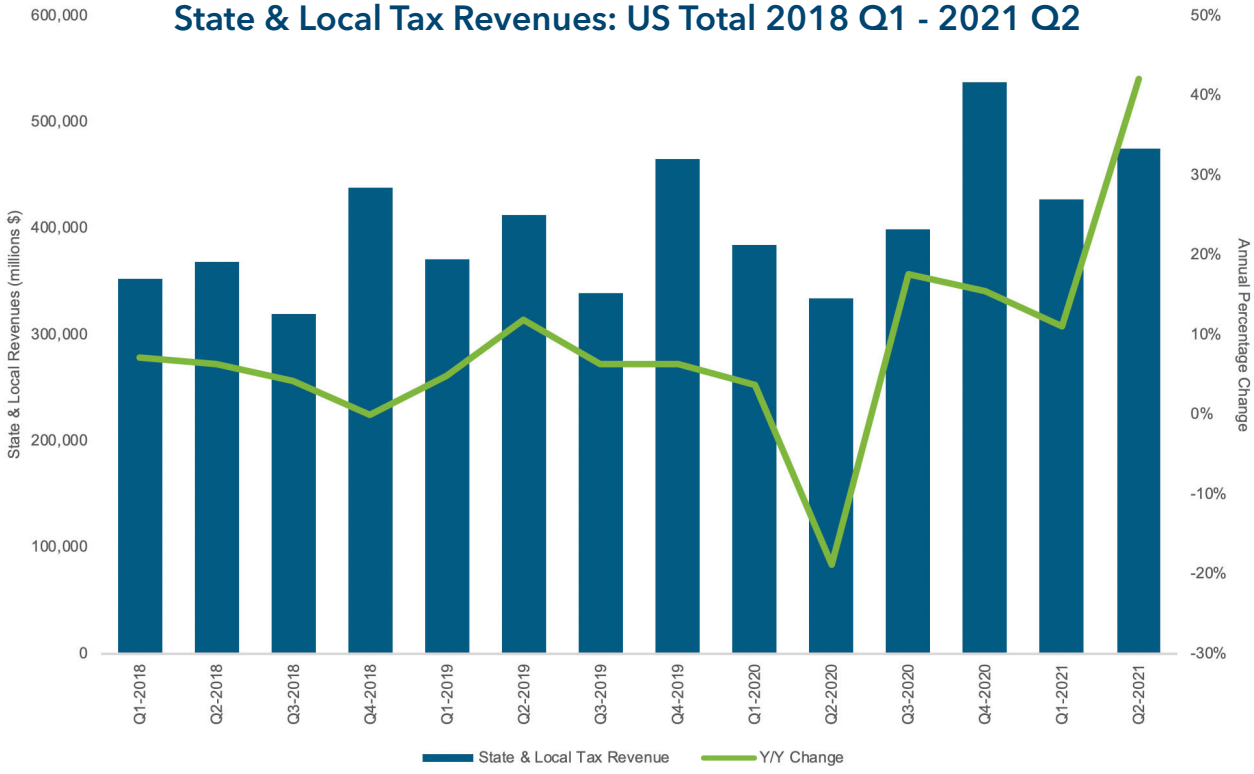
	August 2021 **PPI**	M/M August 2021/ July 2021 **% change**	Y/Y August 2020/ August 2019 % change	Y/Y August 2021/ August 2020 **% change**	August 2021/ 2019 **CAGR**
Final Demand Construction (PPI = 100 Nov 2009)	130.7	0.2%	3.7%	0.8%	2.3%
Construction for Private Capital Investment (PPI = 100 Nov 2009)	137.8	0.4%	2.1%	5.4%	3.7%
Construction for Government (PPI = 100 Nov 2009)	129.8	0.2%	3.9%	0.5%	2.1%
Construction Materials (PPI = 100 1982)	315.8	0.1%	2.8%	31.1%	16.1%
Lumber (PPI = 100 1982)	282.6	-19.3%	29.3%	4.6%	16.3%
Softwood Lumber (PPI = 100 1982)	285.8	-27.3%	47.1%	-9.8%	15.2%
Hardwood Lumber (PPI = 100 Dec 2003)	295.2	-0.3%	-2.8%	44.3%	18.4%
Plywood (PPI = 100 Dec 2003)	410.2	-11.5%	30.6%	61.3%	45.1%
Iron and Steel (PPI = 100 1982)	250.8	8.7%	-11.8%	18.2%	2.1%
Steel Mill Products (PPI = 100 1982)	396.3	5.1%	-10.3%	123.1%	41.4%

Shortage of skilled workers will challenge Engineering and Design Services firms to compete and grow revenue

- Demand for workers continues to strengthen, but labor shortages are impeding business activity. There have been a number of factors contributing to the contraction of the labor force: many workers are afraid of getting sick and leaving the workforce, ongoing unemployment benefits prolonged the need for many to return to the workforce, and rising values of homes and retirement accounts have allowed many more baby boomers to transition into retirement since the pandemic started.
- According to Dodge Analytics Civil Quarterly published in June 2021, the share of civil contractors concerned about the ability to hire skilled workers increased from 58% in the fourth quarter of 2020 to 69% in the second quarter of 2021.
- Similarly, according to the inaugural ACEC Research Institute Engineering Business Sentiment Survey (2021 Qtr 4), 97% of engineering firms indicate that there is currently a tight labor market in the industry, and 70% agree that the lack of qualified workers is the single largest barrier to growing their firm over the next 12 months.
- There have been a number of displaced workers from other industries that could provide additional labor force support for Engineering and Design Services, but the challenge is in matching skill sets and providing necessary education, training, support and experience, which is not done overnight.
- Just as material inputs have risen, so have wages, compounding the challenge for Engineering and Design Services firms to compete for skilled labor. As noted earlier in this report, average wages grew 3.8% last year even as industry output was sharply declining. This trend is continuing through 2021 with year-to-date (Aug 2021) average hourly wages up 4.6% when compared to the same period in 2020. This trend is likely to continue in the short run and will challenge Engineering and Design Services firms' ability to grow both the top and bottom lines in 2022.

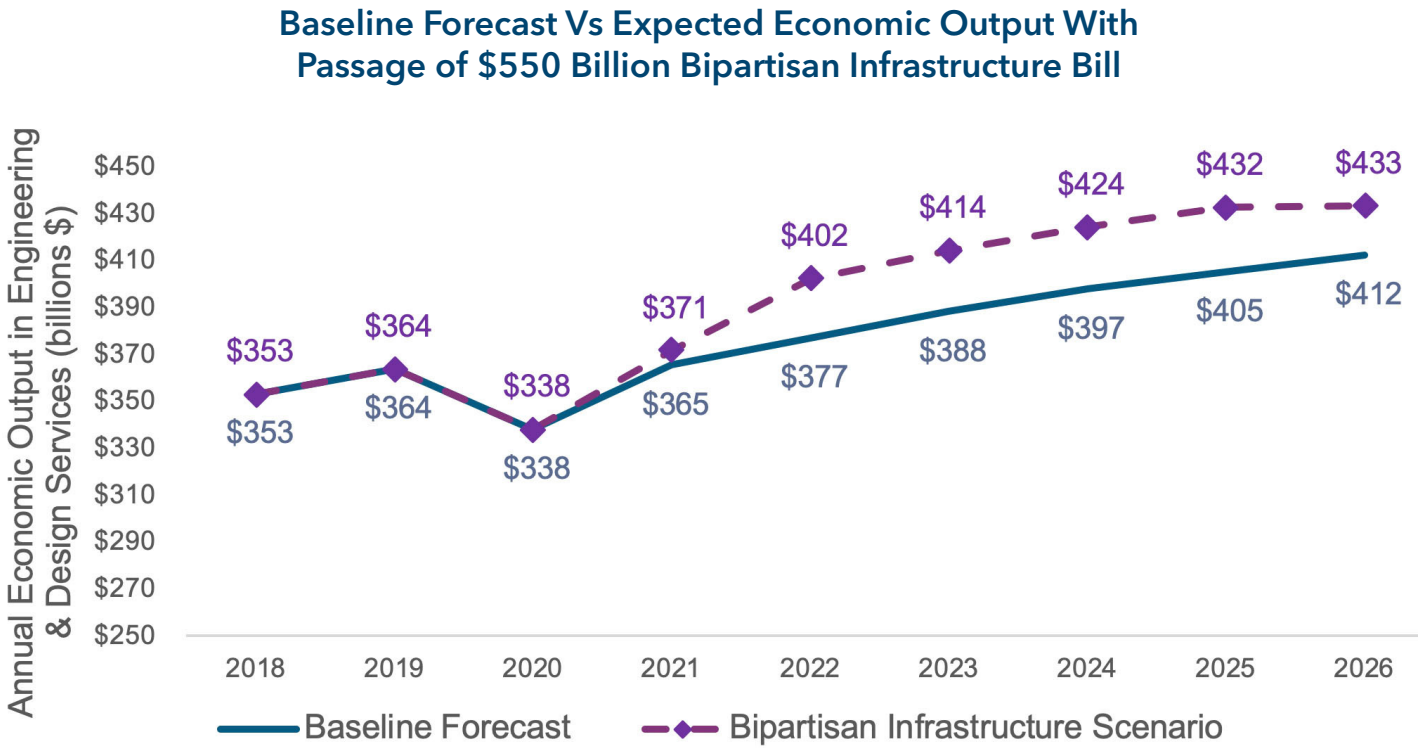
State and local tax collections should provide support for Engineering and Design Services

- The spike in state and local tax collections from the third quarter of 2020 through the second quarter of 2021 (the latest quarter for which we currently have data), was driven by federal stimulus money from the American Rescue Plan Act. Some states suffered from business shutdowns and travel restrictions, but overall state budgets fared significantly better than analysts expected. One reason tax revenue grew is because this recession was different than most in that it primarily affected low-income workers. Most high-earners, who pay the majority of income tax, kept their jobs. While we expect there will be some negative impact to state and local tax receipts in the back half of 2021, states in most regions are likely to have more fiscal room to support Engineering and Design Services over the forecast horizon than we expected in our 2020 analysis.



Potential infrastructure bill presents significant upside to the outlook

- The Bipartisan Infrastructure Bill authorizes a $550 billion increase in appropriations for surface transportation, broadband, and water infrastructure programs over current levels over five to eight years. The legislation allocates $110 billion for roads and bridges, $73 billion for power infrastructure, $66 billion for rail, $65 billion for the power grid, $65 billion for broadband, $55 billion for water projects, $39 billion for public transit, and $25 billion for airports. Additionally, the legislation provides investment in electric vehicle charging stations and prompts a transition to electric school buses.
- We estimate that the passage of the bipartisan infrastructure bill would add $132 billion in economic output in the Engineering and Design Services sector over the next five years. This represents an average annual increase in Engineering and Design Services economic activity (over and above the baseline) of 5.6% over the forecast period.



STUDY APPENDIX

Engineering and Design Services Industry Definition

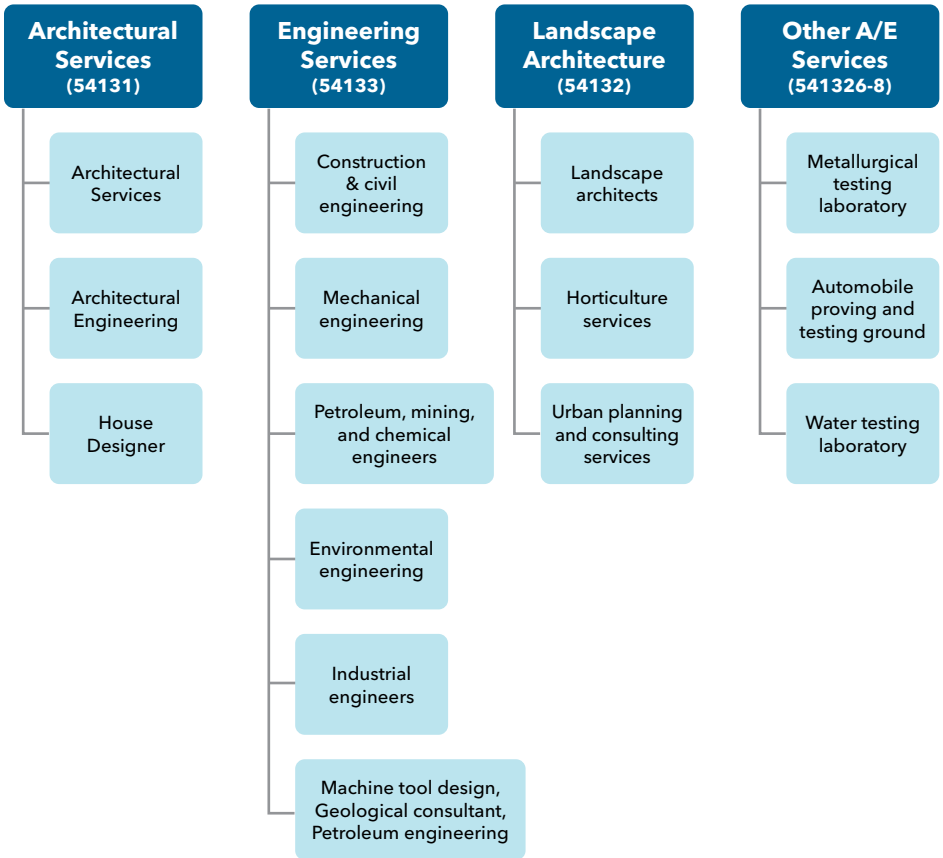
The definition of the Engineering & Design Services industry has been primarily developed based upon the ways in which public and private data sources collect and publish information from all businesses across the U.S. -the North American Industry Classification System, or NAICS. NAICS is a hierarchical 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, & Technical Services" and includes both private and public sector organizations from a number of 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 & 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.
- 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 a number of 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.

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 of 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 – 2026 Engineering Industry Forecast Methodology

The foundation for the forecast for Engineering and Design Services includes the historical trends of sector-level output 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 Engineering and Design Services with overall A/E output. 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.

The U.S. Bureau of Economic Analysis (BEA) revised their 2019 and 2020 gross output numbers since our previous report. ACEC and Rockport Analytics made the decision to incorporate the adjustments into our numbers in this report for both years. Because of that, the numbers don't match what was in the previous report but are more accurate for the current analysis.

The 2022 – 2026 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

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.

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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.

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