

Architectural & Engineering Services

8.18.2020

NAICS CODES: 5413

SIC CODES: 8711, 8712, 8713

Industry Overview

Companies in this industry plan and design residential and nonresidential buildings and structures as well as apply engineering principles to design and develop systems and structures. Major companies include AECOM, Jacobs, HDR, and KBR (all based in the US), as well as Fugro (The Netherlands), Nikken Sekkei (Japan), Wood (UK), and Worley (Australia).

Global construction output, a main driver for architectural and engineering services, is growing quickly and will reach \$15.5 trillion by 2030, according to PricewaterhouseCoopers. Much of that growth will be concentrated in China, the US, and India, but small, export-oriented countries in Asia also are expected to see significant growth. Large architectural and engineering firms are increasingly looking for overseas projects to capitalize on growth in other countries.

The US architectural and engineering services industry includes about 115,000 establishments (single-location companies and units of multi-location companies) with combined annual revenue of about \$320 billion.

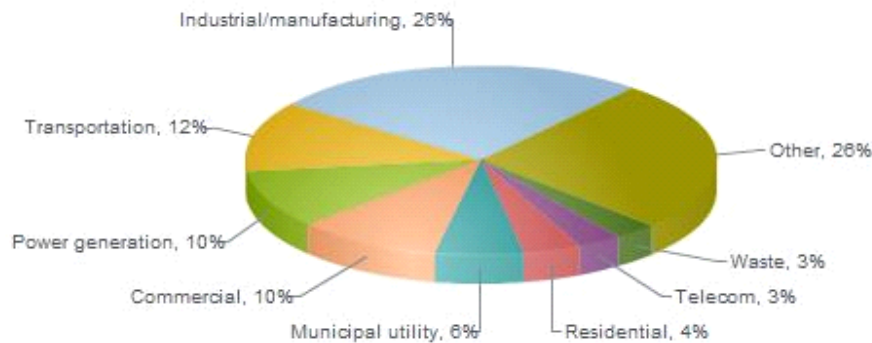
Competitive Landscape

Demand for architectural and engineering services is driven by residential and commercial construction activity, as well as corporate and government spending. Profitability depends on a company's ability to attract a constant flow of work through contracts, as well as the ability to **accurately predict costs** for projects. Small firms can effectively compete with larger ones by offering **expertise** in a particular field. Large firms are better equipped to design and manage large projects in diverse geographic areas. The US industry is **fragmented**: the 50 largest firms account for about 30% of industry revenue.

Products, Operations & Technology

Major services include preparing detailed architectural plans or blueprints, and engineering designs that can be used in the construction process. Companies also provide consulting services and construction management for a broad range of projects.

Revenue by Project - US Census Bureau (2012)



Large architecture and engineering firms work for public and private sector clients around the world. They may serve a broad range of end markets including transportation, facilities, environmental, energy, water, and government. A small portion of architecture work is residential. Most is nonresidential design work ranging from schools, office buildings, hospitals, and retail buildings. Companies often specialize in serving certain market sectors such as infrastructure, oil and gas, transportation, or industrial.

Employees are highly skilled and are valuable assets to companies. Firms must attract and retain qualified architects and engineers to draw high-profile clients and to remain competitive and successful.

Technology

Computer-aided design (CAD) software and building information modeling (BIM) are common tools within the industry that allow for information sharing and digital project planning and management.

3D printing technology, which transforms computer renderings into physical objects, allows architects and engineers to create models or prototypes easily and affordably. While smaller, consumer-oriented 3D printers can be used for small-scale projects, larger ones can be used to "print" entire buildings or other objects. Architects around the world are experimenting with printing models of homes and other structures.

Engineering firms are increasingly using unmanned aerial vehicles to conduct site surveys and assessments. Images collected by drones can be used to create 3D maps or infrared images and to do complex modeling. Drones can also be used by architects and engineers to inspect and access hard-to-reach areas, lowering the risk of workplace injuries, reducing labor expenses, and improve efficiencies in data collection.

Sales & Marketing

Typical customers are corporations, real estate developers, and local, state, and federal governments. Companies mainly rely on cultivating relationships with new and existing clients. Large companies also rely on their reputation and on client **referrals** to grow the business. Most firms spend very little on advertising or marketing.

Many firms depend on large customers for repeat business. Some firms rely on contracts with the federal government for a majority of their work. Others have ongoing relationships with **industrial corporations**, real estate developers, and manufacturing companies.

Most engineering contracts are obtained through a **bidding process**. In the private sector, a customer typically invites several firms to bid on a particular project. Public sector bids are usually open to all bidders who meet certain basic technical and financial qualifications. The bidding process usually involves preparing a detailed plan of action for a project and a cost estimate. Firms often **collaborate** to bid on large projects that require a range of expertise. Similarly, architecture firms are often invited to submit plans for a project and must compete to be selected.

Contracts are mainly awarded based on the cost of construction. Under a **fixed-cost** (or lump sum) contract, an engineering firm is responsible for any costs incurred in excess of those forecast, but can also make a bigger profit if costs are less. Under a cost reimbursable (or **cost plus**) contract, the customer pays for all costs, plus a fee that may be a lump sum or a markup on labor costs. Under a **guaranteed maximum price** contract, the customer pays a fee plus all costs up to a maximum amount. Additional terms may be negotiated in any of these contracts to address how costs are handled if the customer changes the project's scope.

Finance & Regulation

Labor is a major expense at most architectural and engineering service firms. Company liquidity comes from **cash flow** from operations, debt from credit facilities, and financial markets. Cash flow can be compromised if a sudden economic downturn forces governments or private industries to cut spending and as a result delay, change, or cancel a project.

Many firms have a **backlog** of projects, sometimes representing up to a year or more of future work. Companies also account for **customer relationships**, which represent existing contracts with current clients. Customer relationships can include contracts ranging from one year to 10 years or more.

Working Capital Turnover by Company Size

The working capital turnover ratio, also known as working capital to sales, is a measure of how efficiently a company uses its capital to generate sales. Companies should be compared to others in their industry.



Financial industry data provided by MicroBilt Corporation collected from 32 different data sources and represents financial performance of over 4.5 million privately held businesses and detailed industry financial benchmarks of companies in over 900 industries (SIC and NAICS). More data available at www.microbilt.com.

Regulation

Architecture and engineering companies in the US are not directly regulated. However, they must adhere to federal, state, and local building codes, **safety regulations**, hiring practices, and environmental regulations, among others. Public projects often involve stricter regulations.

Because architects' decisions can affect public safety, architects undergo specialized training that may include advanced degrees and internships or practical experience required for a license to practice architecture. Requirements can vary by state or country. Architecture firms that work internationally must adhere to local government regulations and are subject to the US Foreign Corrupt Practices Act and other laws. Many engineering societies also have their own codes of practice and ethics.

International Insights

Global construction output, a main driver for architectural and engineering services, is growing quickly and will reach \$15.5 trillion by 2030, according to PricewaterhouseCoopers (PwC). Much of that growth (some 60%) will be concentrated in China, the US, and India, but small, export-oriented countries in Asia are also expected to see significant growth. Large architectural and engineering firms are increasingly looking for **overseas projects** to capitalize on growth in other countries.

Top firms based outside the US include Fugro (Netherlands), Nikken Sekkei (Japan), Wood Group (UK), and WorleyParsons (Australia). Many large US firms have international operations.

Emerging markets such as China, Brazil, and India are building infrastructure, industrial and manufacturing plants, residences, and retail buildings at a rapid pace to keep up with demand and to serve their expanding middle class. Other countries that present opportunities for architects and engineers include Indonesia, Vietnam, Thailand, and the Philippines, where export-oriented manufacturing is boosting construction needs. More than half of all construction activity is in emerging markets and, as a result, demand for architects and engineers in these countries is high. Rebuilding war-torn areas is also an emerging trend in certain parts of the world.

Global demand is also increasing for environmentally friendly **green buildings** and infrastructure in cities. Architects and engineers are offering building designs that help reduce energy usage, water consumption, and carbon emissions. Additionally, as construction projects become more complex to meet these changing needs, companies need to employ more and better trained architects and engineers who can design and build innovative structures.

Architectural and engineering services firms with worldwide operations are vulnerable to risks in developed and emerging markets alike. **Regulatory requirements** vary across developed nations, while political unrest, poverty, corruption, and fraud present challenges to working in emerging regions. Managing foreign risk is especially critical for firms with significant international revenue.

Regional Highlights

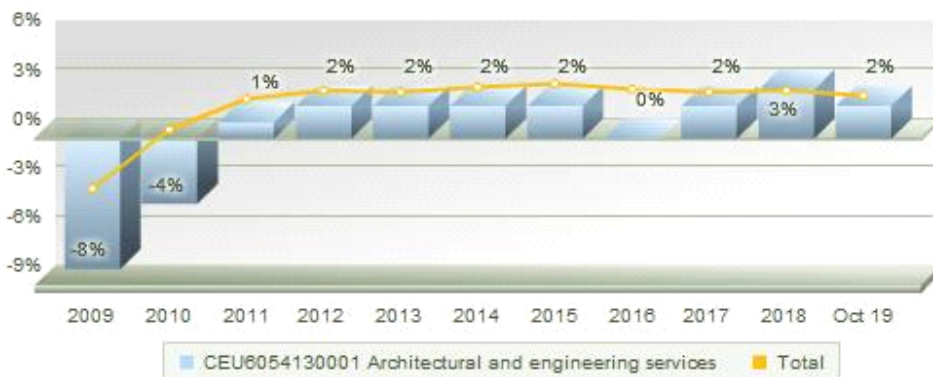
In the US, construction activity is highest in states with large populations and major business centers. **California, Texas, Florida, New York, Illinois, and Colorado** have the most architectural and engineering services firms. Smaller companies often work locally and are sharply affected by changing regional economic conditions. Large companies typically prefer to work in a range of markets to reduce exposure to risks that may affect a particular geographic region.

Human Resources

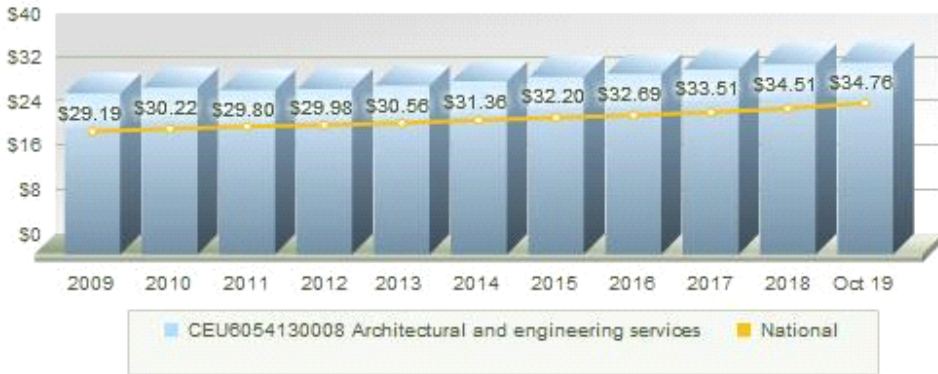
Architects and engineers are highly trained and often licensed professionals who plan, design, and oversee complex construction projects. Most have at least **bachelor's degrees**. Because public safety can be involved, some technical training and/or certifications may be required of architects and engineers. As a result, wages for the industry in the US are **significantly higher** than the national average.

Construction growth and the demand for workers with advanced technical skills are improving job prospects for all types of engineers. **Civil engineers** are in greatest demand among the engineering disciplines, according to the US Bureau of Labor Statistics. Demand for engineers is also being driven by older engineers reaching retirement age. In addition, the increase in construction around the world is creating new opportunities for engineers. Employment for architects also is projected to grow faster than for most other occupations over the next several years.

Industry Employment Growth
Bureau of Labor Statistics



Average Hourly Earnings & Annual Wage Increase
Bureau of Labor Statistics



Industry Growth Rating



Demand: Depends on commercial and residential construction
 Need ability to estimate costs accurately
 Risk: Reliance on key personnel

Quarterly Industry Update

8.18.2020

Opportunity: Recovery Through the Changes Due to COVID-19 - Architectural and engineering service firms can recover from the negative effects of the COVID-19 pandemic by selecting or designing systems and infrastructures that ensure the health and safety of the public against the coronavirus. A number of convention centers, gymnasiums, dormitories, hotel rooms, and parking lots have been converted into alternate patient care facilities to lighten the load of the hospitals. The American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) recommends that residences and commercial spaces should be equipped with heating, ventilation, and air conditioning (HVAC) systems that provide air filtration and fresh air and exhaust ventilation to control infectious aerosols. Schools and commercial spaces can be redesigned with touchless entry and fixtures, germ-resistant materials, and humidity control. Woods Bagot in Australia introduced the Split Shift Home design that uses moveable walls to allot spaces at home for an office, food storage, and for planting fruits and vegetables. An architecture company in Austria designed Parc de la Distance, a maze-like park that prevents crowds and ensures social distancing with paths 2.4 m apart separated by hedges. An architect designed a 16-sqm micromarket that can be easily assembled in public areas close to the communities and ensures social distancing. Some places in Europe are aiming to establish compact cities where the providers of basic needs and services are close to the people in order to reduce commute times, air pollution, noise, energy consumption, and the possibility of spreading the coronavirus.

Industry Impact - Architectural and engineering services will see an increase in projects due to the need to adapt buildings and infrastructures to preventing the transmission of coronavirus.

8.17.2020

Opportunity: Recovery Through the Changes Due to COVID-19 - Architectural and engineering service firms can recover from the negative effects of the COVID-19 pandemic by selecting or designing systems and infrastructures that ensure the health and safety of the public against the coronavirus. A number of convention centers, gymnasiums, dormitories, hotel rooms, and parking lots have been converted into alternate patient care facilities to lighten the load of the hospitals. The American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) recommends that residences and commercial spaces should be equipped with heating, ventilation, and

air conditioning (HVAC) systems that provide air filtration and fresh air and exhaust ventilation to control infectious aerosols. Schools and commercial spaces can be redesigned with touchless entry and fixtures, germ-resistant materials, and humidity control. Woods Bagot in Australia introduced the Split Shift Home design that uses moveable walls to allot spaces at home for an office, food storage, and for planting fruits and vegetables. An architecture company in Austria designed Parc de la Distance, a maze-like park that prevents crowds and ensures social distancing with paths 2.4 m apart separated by hedges. An architect designed a 16-sqm micromarket that can be easily assembled in public areas close to the communities and ensures social distancing. Some places in Europe are aiming to establish compact cities where the providers of basic needs and services are close to the people in order to reduce commute times, air pollution, noise, energy consumption, and the possibility of spreading the coronavirus.

Industry Impact - Architectural and engineering services will see an increase in projects due to the need to adapt buildings and infrastructures to preventing the transmission of coronavirus.

6.29.2020

Opportunity: Sustainability through Green Building - Increased global climate awareness and response provides opportunities for architecture and engineering companies through green building. Designing and building structures that are environmentally responsible and resource-efficient becomes an increasing trend and demand. There are more than 35,400 projects certified under Leadership in Energy and Environmental Design (LEED) standards in the US alone, while there are more than 48,600 green building projects worldwide, based on Commercial Property Executive's report. Colorado ranked first in the U.S. Green Building Council (USGBC)'s Top 10 States for LEED Green Building of 2019, with 102 green building projects.

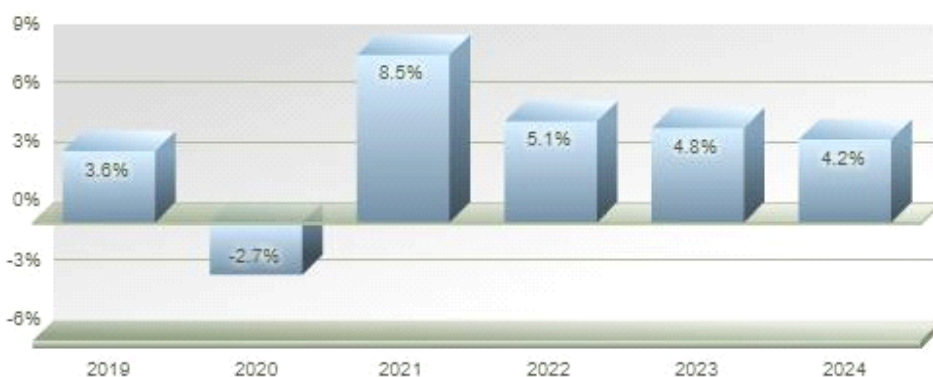
Industry Impact -

3.23.2020

Opportunity: Sustainability through Green Building -

Industry Forecast

Revenue (in current dollars) for US architectural and engineering activities is forecast to grow at an annual compounded rate of 5% between 2020 and 2024. Data Published: July 2020



First Research forecasts are based on INFORUM forecasts that are licensed from the Interindustry Economic Research Fund, Inc. (IERF) in College Park, MD. INFORUM's "interindustry-macro" approach to modeling the economy captures the links between industries and the aggregate economy. [Forecast FAQs](#)

Industry Drivers

Changes in the economic environment that may positively or negatively affect industry growth.

Data provided by First Research analysts and reviewed annually



Interest Rates Change in prime and related interest rates



Construction Spending Change in the overall level of commercial and residential construction spending

Critical Issues

Dependence on Construction Activity - Demand for architectural and engineering services is vulnerable to economic downturns and fluctuations in government and private industry spending. Economic and financial market conditions impact the ability of governments and corporations to pay for new construction or maintenance projects. When sudden downturns occur, projects can be curtailed or canceled.

Dependence on Skilled Personnel - Professional expertise is a major asset for architectural and engineering services firms. Companies within the industry rely on key employees and their knowledge and skills to complete complex projects. Demand for qualified technical and management personnel is high and replacing staff can be difficult.

Business Challenges

Strong Competition - The industry is highly competitive and firms must vie for work on a regional, national, and international basis. Smaller firms can compete by specializing in a certain sector or geographic area. Heightened competition can impact a company's ability to win bids or tighten revenue margins.

Vulnerability to Litigation - Engineering firms are vulnerable to liability lawsuits, as the result of poor work and inattention to regulations, as poor engineering work can result in injury and death. The increasing complexity of many engineering projects increases the likelihood of errors. Engineering services firms must comply with a large number of regulations, the improper handling of which can result in criminal fines and penalties, significant risks, or mean that a firm's insurance policies may not provide adequate coverage.

Uneven Workload, Cash Flow - Because work in the industry is done on a project basis, demand can be very uneven, especially for smaller firms. Cash flow is also uneven, even for firms that have continuous work, because the bulk of payments are typically made upon completion of a project. Small firms can't usually afford to cut their workforce when activity is slow.

Dependence on Government Contracts - Firms that rely on government contracts can be negatively impacted by spending cuts or government shutdowns. Any reduction in government spending hurts demand for architectural and engineering services, and some firms may be forced to furlough or lay off workers. Prolonged shutdowns or drastic spending reductions also could result in the cancellation of or delay of existing projects.

Increasingly Complex Regulations - Technology and security considerations have affected building and infrastructure design, and state and local building codes have become more complicated. Tracking and complying with all regulations can be difficult for architects, especially if they work on a project outside their usual territory.

Business Trends

Consolidation - The need for a steady supply of contract work and increased customer demand for a variety of architectural and engineering services have led to consolidation within the industry. Larger companies tend to be stronger financially and can offer customers a diverse skill set, resulting in increased revenue. Consolidation also

can enhance technical services across end markets. Demand for architectural and engineering services tends to increase along with new business development and increased construction spending. Larger firms are better able to expand their geographic reach and add employees.

Design-Build Contracts - Traditionally, the design and building of a project were handled by separate architecture and engineering firms. However, more large projects are being awarded to firms that can handle both phases. To compete for design-build contracts, more companies are integrating architectural and engineering teams to work together in the design-build process.

Skills Gap - As a result of the Great Recession from 2007-2009, many architects in the US lost their jobs and didn't return to the profession. Since then, the industry has been successfully attracting and training young architects while also retaining highly skilled ones. But the absence of middle-range architects is creating a noticeable gap in talent among some firms. To make matters worse, pricing pressure felt by design firms has translated into staff reductions and slashed employee benefits.

Industry Opportunities

Demand for Engineers Heats Up - Job prospects for all types of engineers are highly favorable, with civil engineers gaining the largest employment increase among the various disciplines, according to the US Bureau of Labor Statistics. Demand for engineers is increasing as older engineers retire. Also increased global growth in the industry is creating new opportunities in the field. Increased demand also means increased wages. The median pay for engineers in the US is about \$91,000 per year, more than twice the national average, according to the Department of Labor. Job growth is faster than average.

Green Building - Green building, or environmentally sensitive architecture, is benefiting from more government incentives, grant programs, success stories, and better marketing strategies. Design and construction teams that can meet Leadership in Energy and Environmental Design (LEED) standards enable their buildings to receive green certification, which is highly desirable in the marketplace. Architectural and engineering services firms that can design new homes and buildings with environmentally sound features are in demand.

3D Printing Technology - Architects and engineers are using 3D printers to create models or prototypes easily and affordably. The printers allow items to be created instantly from a digital model. New printers can create objects using plastics or metal. The process, which is also called additive manufacturing, can speed up the product development process and create substantial cost savings. While smaller, consumer-oriented 3D printers can be used for small-scale projects, larger ones can be used to "print" entire buildings or other objects. Architects around the world are experimenting with printing models of homes and other structures.

Wider Drone Use - Architectural and engineering firms see more uses for drones and are increasingly likely to invest in unmanned aerial vehicle technology. The US government has streamlined the permission process for drone use by opening up restricted activities of flying drones at night, over people, and beyond the view of the operator. Experts think drones will be an essential resource for engineering and architecture firms going forward because their use can lower the risk of workplace injuries, reduce labor expenses, and improve efficiencies in data collection.

Financial Information

COMPANY BENCHMARK TRENDS

Quick Ratio by Company Size

The quick ratio, also known as the acid test ratio, measures a company's ability to meet short-term obligations with liquid assets. The higher the ratio, the better; a number below 1 signals financial distress. Use the quick ratio to determine if companies in an industry are typically able to pay off their current liabilities.



Financial industry data provided by MicroBilt Corporation collected from 32 different data sources and represents financial performance of over 4.5 million privately held businesses and detailed industry financial benchmarks of companies in over 900 industries (SIC and NAICS). More data available at www.microbilt.com.

Current Liabilities to Net Worth by Company Size

The ratio of current liabilities to net worth, also called current liabilities to equity, indicates the amount due creditors within a year as a percentage of stockholders' equity in a company. A high ratio (above 80 percent) can indicate trouble.



Financial industry data provided by MicroBilt Corporation collected from 32 different data sources and represents financial performance of over 4.5 million privately held businesses and detailed industry financial benchmarks of companies in over 900 industries (SIC and NAICS). More data available at www.microbilt.com.

COMPANY BENCHMARK INFORMATION

NAICS: 5413

Data Period: 2018

Last Update February 2020

Table Data Format

Mean

Company Size

All

Large

Medium

Small

Size by Revenue		Over \$50M	\$5M - \$50M	Under \$5M
Company Count	92131	143	1818	90170

Income Statement

Net Sales	100%	100%	100%	100%
Gross Margin	60.8%	59.1%	63.9%	66.0%
Officer Compensation	5.2%	5.0%	5.7%	6.1%
Advertising & Sales	0.3%	0.3%	0.3%	0.3%
Other Operating Expenses	53.7%	52.4%	56.3%	57.7%
Operating Expenses	59.2%	57.7%	62.3%	64.1%
Operating Income	1.6%	1.5%	1.6%	1.9%
Net Income	0.8%	0.7%	0.8%	1.0%

Balance Sheet

Cash	16.0%	15.8%	16.2%	16.5%
Accounts Receivable	31.0%	31.2%	31.8%	29.8%
Inventory	3.5%	3.5%	3.6%	3.3%
Total Current Assets	61.5%	61.6%	62.4%	60.6%
Property, Plant & Equipment	17.5%	16.9%	18.5%	20.2%
Other Non-Current Assets	20.9%	21.5%	19.2%	19.3%
Total Assets	100.0%	100.0%	100.0%	100.0%
Accounts Payable	10.7%	10.4%	11.5%	11.7%
Total Current Liabilities	34.0%	33.1%	36.0%	37.0%
Total Long Term Liabilities	20.2%	18.6%	23.3%	26.3%
Net Worth	45.8%	48.3%	40.7%	36.7%

Financial Ratios

(Click on any ratio for comprehensive definitions)

Quick Ratio	1.42	1.46	1.38	1.30
Current Ratio	1.81	1.86	1.73	1.64
Current Liabilities to Net Worth	74.3%	68.6%	88.3%	100.7%
Current Liabilities to Inventory	x9.80	x9.49	x10.08	x11.35
Total Debt to Net Worth	x1.18	x1.07	x1.45	x1.72
Fixed Assets to Net Worth	x0.38	x0.35	x0.45	x0.55
Days Accounts Receivable	54	56	52	48
Inventory Turnover	x23.63	x23.78	x22.36	x23.82
Total Assets to Sales	48.0%	49.4%	45.3%	43.9%

Working Capital to Sales	13.2%	14.1%	12.0%	10.3%
Accounts Payable to Sales	5.1%	5.1%	5.2%	5.2%
Pre-Tax Return on Sales	1.2%	1.1%	1.3%	1.6%
Pre-Tax Return on Assets	2.6%	2.3%	2.9%	3.6%
Pre-Tax Return on Net Worth	5.6%	4.7%	7.1%	9.7%
Interest Coverage	x2.34	x2.13	x2.56	x3.17
EBITDA to Sales	3.7%	3.6%	3.7%	4.0%
Capital Expenditures to Sales	2.4%	2.4%	2.3%	2.4%

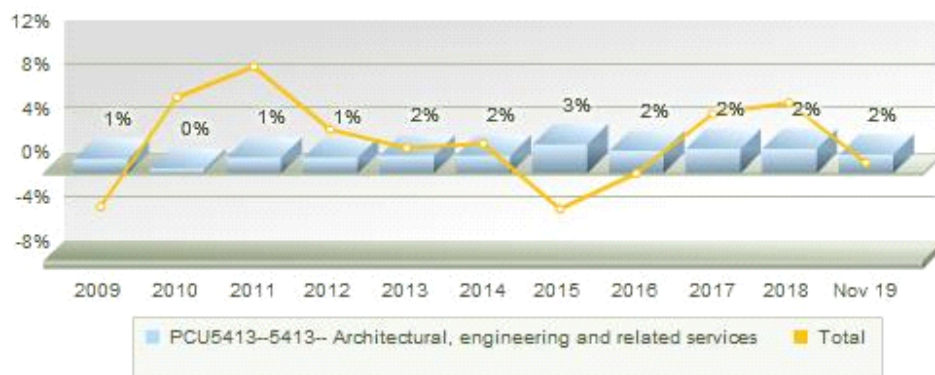
Financial industry data provided by MicroBilt Corporation collected from 32 different data sources and represents financial performance of over 4.5 million privately held businesses and detailed industry financial benchmarks of companies in over 900 industries (SIC and NAICS). More data available at www.microbilt.com.

ECONOMIC STATISTICS AND INFORMATION

Annual Construction put into place - Census Bureau



Change in Producer Prices - Bureau of Labor Statistics



VALUATION MULTIPLES

Architectural & Engineering Services

Acquisition multiples below are calculated medians using at least 3 US private industry transactions completed between 1/2008 and 12/2019 and are based on middle-market transactions where the market value of invested capital (the selling price) was less than \$1B. Data updated annually. Last updated: December 2019.

Valuation Multiple	MVIC/Net Sales	MVIC/Gross Profit	MVIC/EBIT	MVIC/EBITDA
Median Value	0.7	0.8	4	3.4

MVIC (Market Value of Invested Capital) = Also known as the selling price, the MVIC is the total consideration paid to the seller and includes any cash, notes and/or securities that were used as a form of payment plus any interest-bearing liabilities assumed by the buyer.

Net Sales = Annual Gross Sales, net of returns and discounts allowed, if any.

Gross Profit = Net Sales - Cost of Goods Sold

EBIT = Operating Profit

EBITDA = Operating Profit + Noncash Charges



SOURCE: DealStats (formerly Pratt's Stats), 2019 (Portland, OR: Business Valuation Resources, LLC). Used with permission. DealStats is available at <https://www.bvresources.com/learn/dealstats>

Industry Websites

American Council of Engineering Companies

Publications, news bulletins, and training information.

American Institute of Architects

Primary site for industry information, articles, and statistics.

ArchDaily

Global projects, news, and trends in architecture.

Architectural Record

Online magazine, design news.

Civil + Structural Engineer

News about civil and structural engineering.

Engineering News-Record

Design-build news and trends.

Institute of Transportation Engineers

Legislative and regulatory information, employment opportunities, transportation news and events.

National Academy of Engineering

Publications, news, events, directories, and research reports.

Royal Architectural Institute of Canada

Canadian education, resources, events, and lists.

World Architecture Community

News, directories, industry statistics.

Glossary of Acronyms

CAD - computer-aided design

BIM - building information modeling

LEED - Leadership in Energy and Environmental Design