



O'Connor
Construction
Management, Inc.

100% Final Submission - Revised
20 April 2018



MARKET STUDY for Arlington Public Schools

A r l i n g t o n , V i r g i n i a





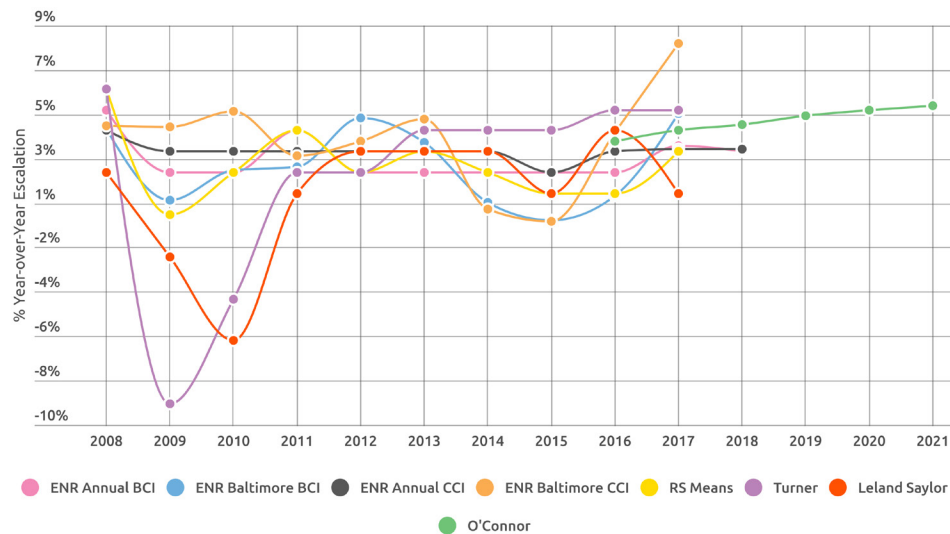
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1 | EXECUTIVE SUMMARY



EXECUTIVE SUMMARY



Source: Engineering News-Record Construction Economics Department, RS Means Construction Cost Index, Turner Construction Cost Index, Leland Saylor, O'Connor Construction Management

Escalation of Construction Cost Indexes

2008-2021

As illustrated to the left, the leading market indexes and O'Connor's independent analysis demonstrate an expected escalation of construction costs of 4-5% percent per annum from 2018 to 2021.¹

Executive Summary

According to the report, "Arlington Public Schools: School Cost & Risk Analysis," published in May of 2014, Arlington Public Schools (APS) notes that the "Long term average [of construction cost] in DC Metro region is 2.5 to 3.0% per year.... Appropriate escalation is included in all APS cost estimates."



Based on the data presented in this market study, we strongly advise APS to update and modify these guidelines to account for at least a five (5) percent year-over-

year escalation of construction costs for projects commencing construction in 2018 through 2021.

In addition to the escalation rate, OCMI recommends an additional 5% estimating and bidding contingency be included, due to increasing market volatility, subcontractor labor shortage, and overall competitiveness in the marketplace.

The three (3) significant issues leading to the rise of total construction costs – locally and nationally – include:

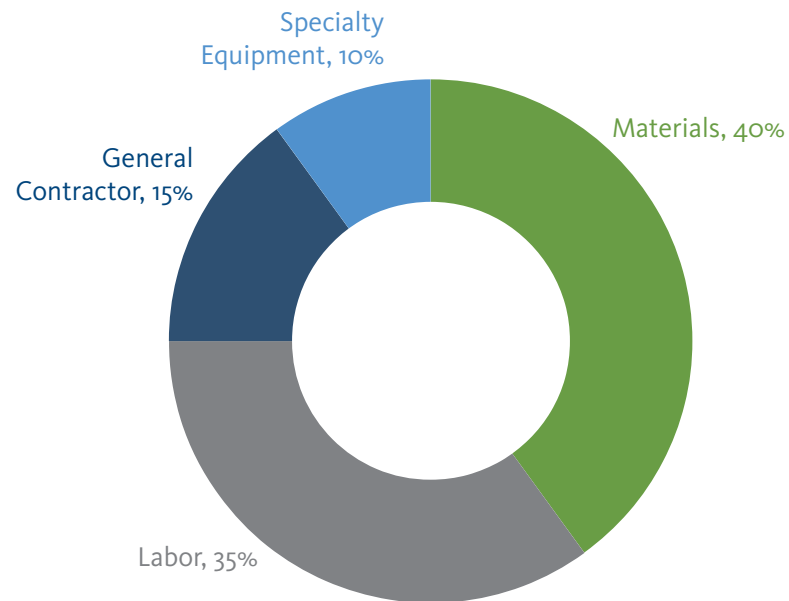
- Ongoing Labor Shortage
- Rising Labor & Materials Costs
- Law of Supply & Demand

1) Ongoing Labor Shortage

According to statistical data and our firm's experience in working with local business leaders, contractors, and industry professionals, there is an inadequate number of locally-sourced skilled and unskilled labor to support construction projects in the DMV - the District of Columbia, Maryland, and Virginia.

¹ Engineering News Record Construction Economics Department; RS Means Construction Cost Index; Turner Construction Cost Index; Leland Saylor; O'Connor Construction Management

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The total cost of construction of any project is made up of a variety of factors. This graphic illustrates the total cost of construction of a typical building/project. Seventy-five (75) percent of the total cost is made up of materials and labor. Price jumps in either or both of these categories will result in - sometimes significant - net effect increases in the costs of construction projects.

A 2017 Construction Outlook Survey, conducted by the Associated General Contractors (AGC) of America, interviewed contractors in all fifty (50) states, plus the District of Columbia. In Virginia:

- 78% forecast it will become harder, or will continue to be just as hard, to find qualified construction professionals

- 72% are concerned about worker shortages
- 59% are having a hard time filling salaried and craft positions.²

Further, since October of 2016, the month-to-month change of construction employment in the DMV has remained relatively flat. In addition, only modest

The data and analysis collected and presented in this market study will further assist APS in making informed decisions regarding the current and future design and construction of its school projects.

² The Associated General Contractors of America, "2017 Construction Outlook Survey Results National Results," and "2017 Construction Outlook Survey Results Virginia Results"

EXECUTIVE SUMMARY

construction employment gains have been made in the Washington, DC suburbs.

2) Rising Cost of Labor & Materials

Due to challenges with low supply and high demand, contractors are paying their workers more to retain them and to attempt to meet both current and future needs of the industry.

- Hourly earnings of construction workers have increased by 20 percent over the past ten (10) years.
- A majority of contractors report providing “higher base pay” to retain or recruit workers.
- Construction workers earn nearly (ten) 10 percent more per hour than the average private-sector worker.³

The most significant effect of the total price of a construction project is the charge of materials, representing 40 percent of a project’s cost.

According to the real estate broker and analyst, Jones Lang LaSalle (JLL), over the past 12 years construction “material costs have grown by nearly 30 percent.”⁴

The Producer Price Index (PPI) reveals an overall 3.8 percent increase in the price of construction materials, from January 2016 to January 2017. The YTD PPI of the most frequently used construction materials underscore dramatic price increases, nearly all above the national average of two (2) percent.

3) Law of Supply & Demand

The national and local construction industry has recovered - and surpassed - pre-recession levels.

- The share of the U.S. Gross Domestic Product (GDP) from construction has been rising. From 2014 to 2017, it has increased by 26 percent, from \$635 billion to \$800 billion, illustrating a robust rebound and continued strength of the industry.
- The Washington, DC metropolitan area has witnessed an increase of more than 16 percent in total construction spending since 2013, according to Engineering News Record (ENR).

Utilizing the data and analysis presented in this market study, APS will be able to determine if it has appropriately allocated the necessary capital to ensure its projects remain within budget, or if additional funding and/or value engineering exercises will be needed to maintain each project’s budget.

- Overall construction spending in the DC-VA metropolitan area has increased from \$12.935 billion in 2013 to a projected volume of \$15.440 billion in 2017.
- ENR expects total construction spending to increase by around 11 percent from 2016 to 2017.⁵

However, in the Washington, DC area, APS is competing against larger commercial developments, housing, hospitality, government and other projects that demand a tremendous amount of construction labor and materials.

3. The Associated General Contractors of America, “2017 Construction Outlook Survey Results National Results.”

4. Jones Lang LaSalle, “Despite Uncertainty Construction Continues Towards Sustainable Growth.”

5. Engineering News Record, “Mid-Atlantic Scoop: Construction Starts Washington, D.C.”

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The local marketplace is incredibly competitive. As such, general contractors can afford to be selective in their pursuit of work.



As they face uncertainties, like the availability of labor and of construction materials, contractors will increasingly bid at higher prices.

Background

At the request of APS, O'Connor Construction Management, Inc., (OCMI) has prepared an in-depth study of the local (District of Columbia, Maryland, Northern Virginia) and U.S. construction markets.

This study identifies the influences affecting the overall characteristics of the construction industry relative to the costs of construction projects over the course of the next five (5) years. In this study, we present data and analysis on the following topics:

- State of Overall Construction Industry
- Industry Employment (Skilled & Unskilled Labor)
- Availability & Costs of Construction

Materials/Equipment

- Current & Future Construction Projects

As detailed on the previous page, these factors combine to contribute to the total cost of construction of a project.

Not one single item disproportionately alters the results of an increase, decrease, or stabilization of construction costs, per say. Rather, multiple forces, working in concert together, on national and local levels, drive the increasing costs of construction that APS and others are currently experiencing on their ongoing and future projects.

APS Mission, Vision, and Values

Through its student achievement and success, the dedication and commitment of its faculty and employees, APS has rightfully earned a prestigious position within the nation's public school's system. Its Mission, Vision, and Core Values reflect a school district at the forefront of K-12 education programming and pedagogy.

- APS' **Mission** "instills a love of learning in its students and prepares them to

be responsible and productive global citizens."

- Its **Vision** speaks of diversity, inclusiveness, academic excellence and integrity. APS cares for its students, their families, and the communities in which their students and faculty reside.
- As its **Core Values**, APS emphasizes "Excellence, Integrity, Diversity, Collaboration, Accountability, and Sustainability."

APS' Mission, Vision, and Core Values are just some of the many reasons why it is envied and looked up as a model that neighboring local districts and others emulate.

Current & Future APS Projects

With an ever-growing student population and less real estate to develop newer, larger schools, APS confronts capital and budgetary challenges. At present, APS has several renovation and new construction projects within its pipeline, either in design or under construction, and expected to be finished between 2019 and 2022. The combined construction portfolio of these APS projects exceeds \$300 million.

EXECUTIVE SUMMARY

2019

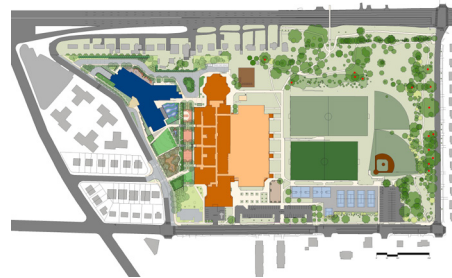


WILSON SCHOOL

The most notable example of APS' commitment to design and construction, the Wilson School will accommodate various programs and pedagogies. Holding 775 seats, the urban vertical school is under construction and will be completed by September of 2019. The estimated project cost is \$101 million.

STRATFORD MIDDLE SCHOOL

The existing site of Stratford Middle School is undergoing a renovation and addition. With an estimated seat capacity of 1,000 and maximum construction costs of \$39.15 million, the project is expected to be completed by September 2019.



ALICE WEST FLEET ELEMENTARY SCHOOL

The design and construction of this new elementary school is on the site of the Jefferson Middle School with the estimated project costs of \$59 million. The school is currently under construction and is slated to open in September of 2019.

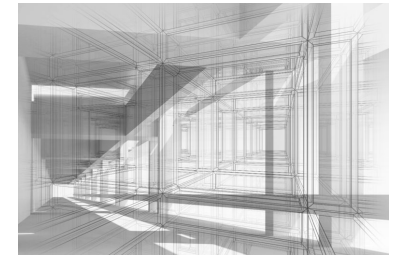
2021

REED ELEMENTARY SCHOOL

As part of its 2017-2026 Capital Improvement Plan, APS is preparing for the design and construction of a new 725-seat elementary school. The estimated construction cost is \$55 million, and it is slated to be completed for the 2021-2022 school year.



2022



EDUCATION/CAREER CENTER

The School Board's FY17-26, adopted in June 2016, included a capital project or projects to provide 1,300 high school seats at a location or location to be determined and to be completed by September 2022. In June of 2017 the School Board approved a capital project to renovate the former Education Center to create 500 to 600 high school seats and to renovate and expand the Career Center to create 700 to 800 high school seats.

2 | NARRATIVE

REPORT



NARRATIVE REPORT

Competitive Construction Market

Since the start of the Great Recession in 2008, the United States' economy has slowly recovered and, in many respects, returned to pre-recession levels.

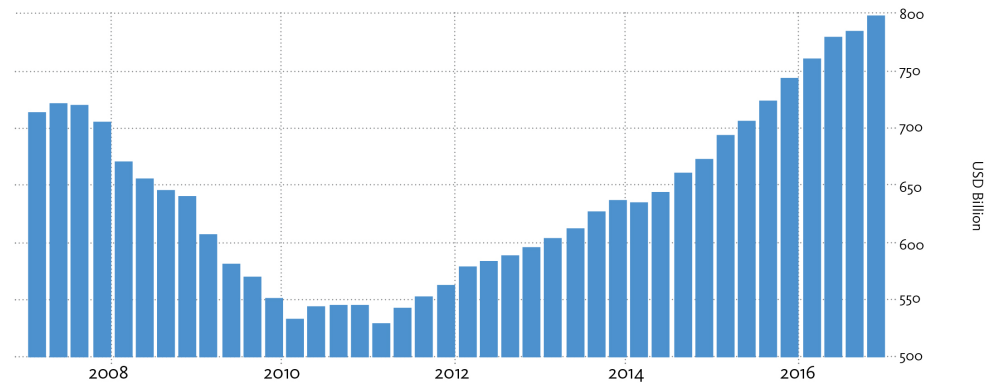
With respect to APS' concerns, in the three (3) geographic areas that affect its construction projects – the District of Columbia, Maryland, and Virginia – the unemployment rate in 2017 has almost returned to levels prior to the Great Recession. In addition, except for DC, Maryland and Virginia's unemployment rates are below the national average.



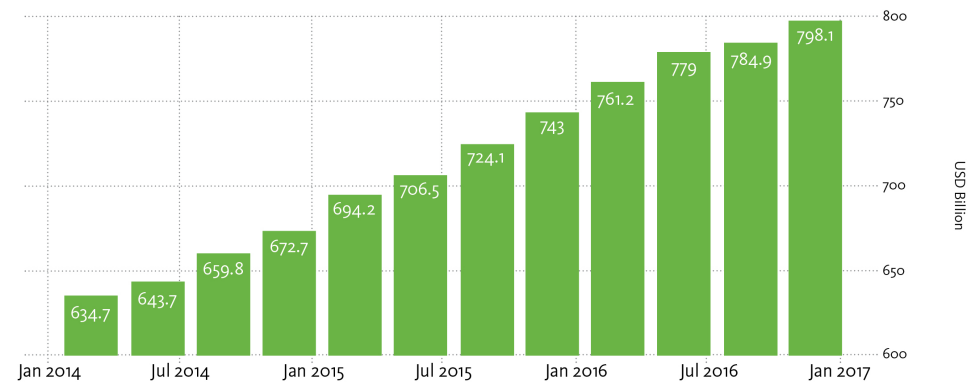
This data underscores an overall strengthening economy and labor environment within the DMV and across various service sectors, including the construction industry.

The share of the U.S. Gross Domestic Product (GDP) from construction has been rising since 2012, and it now surpasses pre-recession levels. From 2014 to 2017, it has increased by 26 percent, from \$635 billion to \$800 billion, illustrating a robust

US GDP FROM CONSTRUCTION



US GDP FROM CONSTRUCTION



Since 2012, the construction industry has rebounded and increased total share of the country's GDP. From January 2014 to January 2017, the construction industry has increased its contribution to the overall GDP by 26 percent, underscoring its continued growth, strength, and significance to both national and local economies.⁵

⁵ Bureau of Economic Analysis, U.S. Department of Commerce



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rebound and continued strength of the industry.

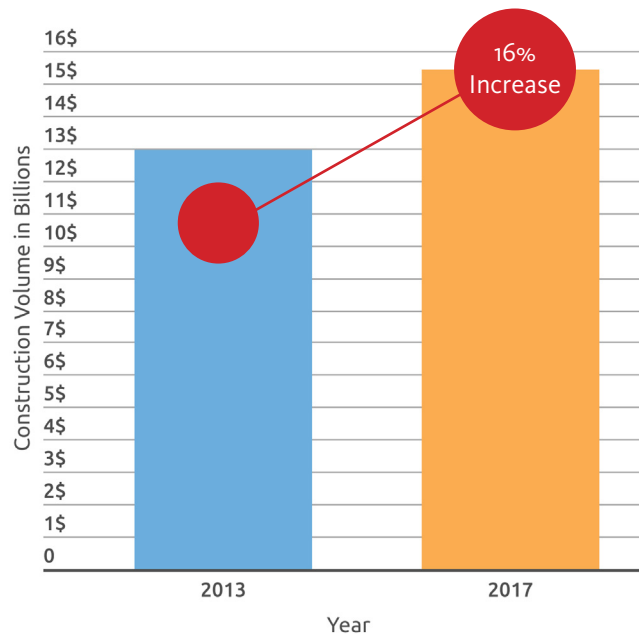
In its most recent third quarter construction index report, the analyst firm Turner notes that it has averaged a five (5) percent increase in its cost index since 2016. According to Turner's Vice President, Attilo Rivetti, "Factors affecting construction costs are the continued, robust level of construction activity combined with many regions experiencing not just one but several mega projects."⁶

The Washington, DC metropolitan area has witnessed an increase of more than 16 percent in total construction spending since 2013, according to the latest statistics from Engineering News Record (ENR).

Overall construction spending in the DC-Virginia metropolitan area has increased from \$12.935 billion in 2013 to a projected volume of \$15.440 billion in 2017. Primarily buoyed by the residential construction market, ENR expects total construction spending in the area to increase by around 11 percent from 2016 to 2017.⁷

"Factors affecting construction costs are the continued, robust level of construction activity combined with many regions experiencing not just one but several mega projects."

Attilo Rivetti, Vice President, Turner⁶



The construction market in the DC-Virginia metropolitan area has experienced an increase of more than 16 percent. Analysts further forecast continued growth, underscoring the overall competitiveness in the region.⁷

DC & VA Construction Volume

2013 - 2017

⁶ Turner Building Cost Index, "2017 Third Quarter Forecast."
⁷ Engineering News Record, "Mid-Atlantic Scoop: Construction Starts Washington, D.C."



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Nearly every sector of the local economy has experienced an increase in construction spending with the exception of the education market, which has undergone a dramatic decrease from \$1.577 billion in 2013 to a projected \$1.174 billion in 2017, a decline by approximately 23 percent.

Facing a shortage of labor, increasing worker wages, and rising material costs (which is discussed in detail later in the market study) general contractors will focus their business development efforts and activities in markets where the money is, such as Commercial and Manufacturing, Residential, and Infrastructure.

Education projects, like ones for APS, other school districts, and higher education institutions will have to confront a lack of interest from general contractors and higher bids from those who choose to pursue this work.

In the Washington, DC area, APS is competing against larger commercial developments, housing, hospitality, government and other projects that demand a tremendous amount of construction labor and materials. In such

DC-VA CONSTRUCTION VOLUME: 2013 - 2017

TOTAL CONSTRUCTION	Actual 2013	Actual 2014	Actual 2015	Actual 2016	Forecast 2017
	\$12,935B	\$20,577B	\$15,364B	\$13,884B	\$15,440B
NON-RESIDENTIAL	\$5,240B	\$5,942B	\$5,035B	\$5,939B	\$6,142B
Commercial & Manufacturing	\$2,593B	\$2,753B	\$2,648B	\$3,865B	\$4,037B
Stores & Shopping Centers	\$456M	\$357M	\$417M	\$379M	\$413M
Office & Bank Buildings	\$1,222B	\$1,027B	\$1,217B	\$1,974B	\$2,298B
Hotels & Motels	\$159M	\$620M	\$247M	\$622M	\$536M
Other Commercial Buildings	\$727M	\$748M	\$760M	\$887M	\$783M
Manufacturing Buildings	\$29M	\$2M	\$7M	\$3M	\$7M
Institutional	\$2,647B	\$3,189B	\$2,387B	\$2,074B	\$2,105B
Education Buildings	\$1,577B	\$1,422B	\$1,653B	\$1,189B	\$1,174B
Healthcare Facilities	\$471M	\$235M	\$139M	\$327M	\$335M
Other Institutional Buildings	\$599M	\$1,532M	\$595M	\$558M	\$595M
RESIDENTIAL	\$5,669B	\$6,274B	\$6,586B	\$6,069B	\$6,079B
TOTAL NON-BUILDING	\$2,026B	\$8,361B	\$3,744B	\$1,876B	\$3,219B

According to ENR, the DC and Virginia construction volume is expected to increase from \$12.9 billion to \$15.4 billion, or approximately 16 percent, from 2013 to 2017. Over the same time period, while the volume of overall construction is rising, new construction in the education market sector is declining, from \$1.5 billion to \$1.1 billion, a substantial decrease of 34 percent.

a competitive environment, general contractors can afford to be selective in their pursuit of certain work.

According to Attilio Rivetti, Vice President of Turner, "We are seeing subcontractors and vendors seeking to combat the ongoing shortage of skilled labor by being more strategic and selective in heated markets."

In addition, as they face uncertainties, like the availability of labor and the cost of construction materials, contractors will increasingly bid at higher prices.

8. Engineering News Record, "Mid-Atlantic Scoop: Construction Starts Washington, D.C."

9. Turner Construction Company, "Turner's Third Quarter Building Cost Index Increases as Construction Activity Experiences Modest Gains."



NARRATIVE REPORT

CRANE WATCH - DC METROPOLITAN AREA ¹⁰

PROJECT	LOCATION	CONSTRUCTION AMOUNT	PROPOSED COMPLETION DATE
Apple Federal Credit Union	Fairfax, VA	N/A	2017
Aperture	Reston, VA	\$72.3 million	2017
1900 Reston Metro Plaza	Reston, VA	N/A	2017
Kingston at Anderson Park	McLean, VA	\$100 million	2017
National Science Foundation HQ	Alexandria, VA	N/A	2017
Alexander Court	Washington, DC	N/A	2017
2000 K	Washington, DC	N/A	2017
The Lexicon	Washington, DC	\$70 million	2017
Museum of the Bible	Washington, DC	\$400 million	2017
700 Penn	Washington, DC	\$226.7 million	2017
View at Waterfront	Washington, DC	N/A	2017
1221 Van	Washington, DC	N/A	2017
99M	Washington, DC	\$55.7 million	2017
The Conway Center	Washington, DC	\$90 million	2017
VY Reston Heights	Reston, VA	N/A	2018
The Signature	Reston, VA	\$155 million	2018
Lumen at Tysons	Vienna, VA	N/A	2018
The Signet	McLean, VA	N/A	2018
Marymount University	Arlington, VA	N/A	2018
Ballston Quarter	Arlington, VA	\$317 million	2018
Homewood Suites by Hilton	Arlington, VA	N/A	2018
Central Place	Arlington, VA	N/A	2018
The Altaire	Arlington, VA	\$100.3 million	2018
National Industries for the Blind	Alexandria, VA	N/A	2018

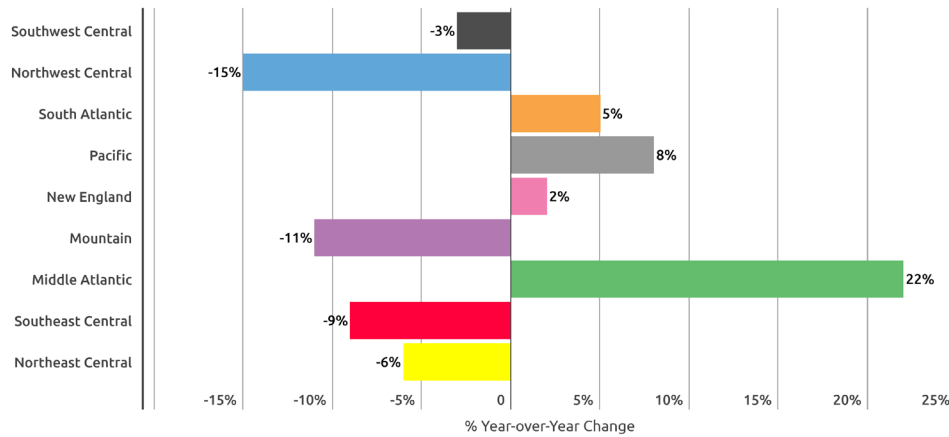
¹⁰. Washington Business Journal, "Crane Watch."

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CRANE WATCH - DC METROPOLITAN AREA

PROJECT	LOCATION	CONSTRUCTION AMOUNT	PROPOSED COMPLETION DATE
The Dalton	Alexandria, VA	N/A	2018
The Thornton	Alexandria, VA	\$133 million	2018
Kennedy Center expansion	Washington, DC	\$175 million	2018
Sonnet	Washington, DC	N/A	2018
2112 Pennsylvania	Washington, DC	N/A	2018
Midtown Center	Washington, DC	\$650 million	2018
One Freedom Plaza	Washington, DC	N/A	2018
Advisory Board HQ	Washington, DC	N/A	2018
Capitol Crossing	Washington, DC	\$1.3 billion	2018
D.C. Bar Association	Washington, DC	N/A	2018
The Lydian	Washington, DC	N/A	2018
Resa	Washington, DC	\$112 million	2018
The Belgard	Washington, DC	N/A	2018
Shapiro Residences	Washington, DC	N/A	2018
901 H	Washington, DC	N/A	2018
International Spy Museum	Washington, DC	\$162 million	2018
The Wharf	Washington, DC	\$1.2 billion	2018
Riverside Baptist	Washington, DC	\$50 million	2018
Valo	Washington, DC	N/A	2018
301M Waterfront	Washington, DC	N/A	2018
D.C. United stadium	Washington, DC	\$300 million	2018
THEARC Phase III	Washington, DC	\$34 million	2018
St. Elizabeths arena	Washington, DC	\$65 million	2018
PSEG Keys Energy Center	Brandywine, MD	\$825 million	2018
The Boro	McLean, VA	N/A	2019

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Source: Engineering News-Record, Dodge Data & Analytics

Construction Starts: Regional Growth vs. National Trends

2016 - 2017

Comparison of year-over-year change in construction starts across the United States reveals that the Middle-Atlantic area is dominating the construction market, further underscoring the region's competitiveness and placing increased pressure on labor recruitment and material prices.

CRANE WATCH - DC METROPOLITAN AREA

PROJECT	LOCATION	CONSTRUCTION AMOUNT	PROPOSED COMPLETION DATE
Pentagon Centre	Arlington, VA	N/A	2019
530 First Street	Alexandria, VA	N/A	2019
Robinson Landing	Alexandria, VA	\$200 million	2019
Conrad Washington D.C	Washington, DC	\$250 million	2019
Universities at Shady Grove, Biomedical Sciences and Engineering Facility	Rockville, MD	\$162 million	2019
Capital One	McLean, VA	N/A	N/A
1700 M	Washington, DC	\$170 million	N/A
St. Matthew's	Washington, DC	N/A	N/A
Skyland Town Center	Washington, DC	\$70 million	N/A

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Doing Business in VA @ Arlington County

In October of 2008, Business Week looked at which metropolitan areas were in the best position to ride out the recession. Arlington was identified as the top location, due to its proximity to the federal government, which “employs thousands of residents, keeps lawyers, lobbyists, accountants, and journalists busy, and pumps money into the region through outsourcing jobs and multi-million dollar contracts.”



Despite these challenges, Virginia has consistently ranked as one of the top states to do business.

A few years ago, Forbes magazine ranked Virginia as the best state to do business. However, that position has slipped in recent years. According to Forbes, “higher business costs and a declining economic climate have pushed [Virginia] lower” in its annual ranking of “Best States for Business.” In 2017, Virginia was ranked #5.

Compared to its neighboring states, Virginia is still dominating. According to the Forbes 2017 list, Maryland ranks #26 and West Virginia is last at #50. The District

of Columbia was not surveyed.

The Commonwealth’s cost of doing business – and its complicated tax structure – may inhibit its ability to recruit and retain businesses.

According to the Tax Foundation, an independent tax policy nonprofit, based in Washington, DC, Virginia ranks #33 on its 2017 “State Business Tax Climate Index,” which measures how well states structure their tax systems to generate business growth. In its analysis of Virginia’s tax structure, the Tax Foundation ranked the Commonwealth:

- #6 for its Corporate Tax Rate
- #40 for Individual Income Tax Rate
- #11 for Sales Tax Rate
- #39 for Unemployment Insurance Tax Rate
- #28 for Property Tax Rate

Among the counties encompassing Northern Virginia, Arlington faces the fiercest competition from Fairfax County.

- Sixteen (16) Fortune 500 companies call Northern Virginia home

- None are in Arlington
- Nearly all are in Fairfax County

Consistent with another survey, conducted in 2015, of the top 15 best places to start or own a business in Virginia, none were in Arlington County. More than half of the cities are in adjacent Fairfax County; other cities were outside of Richmond and the Shenandoah Valley.

Another survey conducted in 2017 of the “Best Large Cities to Start a Business” across the United States reveals that the only ones in Virginia were Richmond (#53), Virginia Beach (#94), and Norfolk, VA (#97), Newport News (#128), Chesapeake (#141).

While Arlington is not perceived as a better place to do business compared to some of its neighboring counties and other areas in the Commonwealth, other data underscore that the County still retains a strong position in the DMV.

- Arlington has consistently had one of the lowest unemployment rates of any jurisdiction in Virginia

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- Over 60 percent of the County’s office space is leased to government agencies and contractors
- The County has maintained the lowest foreclosure rate in the DMV
- Of those who work in Arlington County, 86 percent are commuters, with 27 percent commuting from neighboring Fairfax County
- Number of federal agencies are headquartered in Arlington, including:
 - Air Force Office of Scientific Research
 - DARPA
 - Drug Enforcement Administration
 - Foreign Service Institute
 - DHS National Protection and Programs Directorate
 - Office of Naval Research
 - Transportation Security Administration
 - United States Department of Defense
 - United States Marshals Service
 - United States Trade and Development Agency

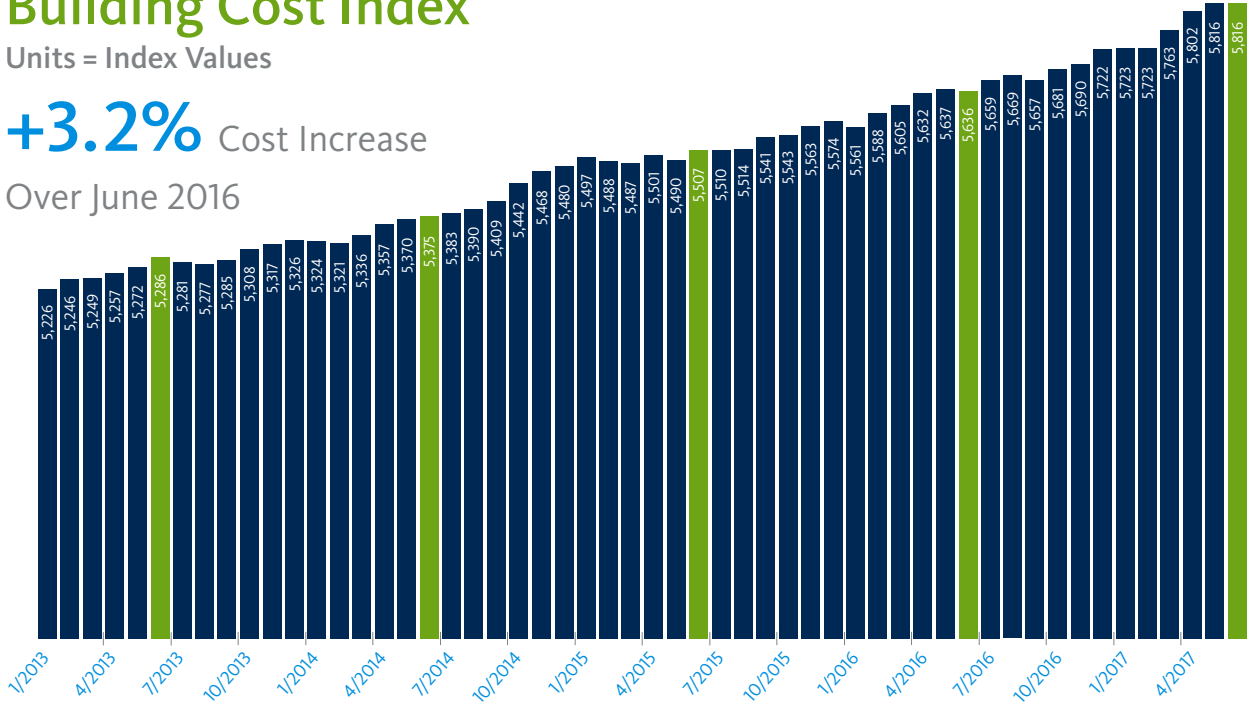
DOING BUSINESS IN VIRGINIA & ARLINGTON COUNTY	
<p><i>Best States to Do Business</i></p> <p>#5 - Forbes Magazine #33 - Tax Foundation</p>	<p><i>Arlington County Stats</i></p> <ul style="list-style-type: none"> • 60% space leased to Fed Gov • One of lowest unemployment rates in Virginia • Lowest foreclosure rate in DMV • 86% Arlington workers are commuters • Large federal presence in Arlington
<p><i>Virginia Tax Rankings</i></p> <p>#6 - Corporate Tax Rate #11 - Sales Tax Rate #28 - Property Tax Rate #39 - Unemployment Insurance Tax Rate #40 - Individual Income Tax Rate</p>	

Building Cost Index

Units = Index Values

+3.2% Cost Increase

Over June 2016



The costs of construction projects are steadily increasing.

The real estate firm, Jones Lange LaSalle (JLL) has measured the overall trend of construction costs dating back to 2012.

Since June of 2016, JLL's Building Cost Index has measured a 3.2 percent increase.

According to JLL's mid-year 2017 report on the state of the construction industry, clients should "Expect building cost indexes to increase steadily over the next two quarters..."¹¹

Factors contributing to these expected cost increases are: 1) growing labor wages in the face of increasing demand of work; and 2)

a stagnant number of laborers entering the construction industry.

According to an Associated General Contractors (AGC) of America study, conducted at the beginning of 2017, most individual analysts expect general increases in hospital/healthcare, retail, and private office construction – each receiving

11. Jones Lange LaSalle, "Despite Uncertainty Construction Continues Towards Sustainable Growth."

NARRATIVE REPORT

2017 VIRGINIA CONSTRUCTION OUTLOOK SURVEY RESULTS ¹²

<p><i>Market Sector Growth</i></p> <p>Hospital/Healthcare +60%</p> <p>Public Buildings +47%</p> <p>Retail + 47%</p> <p>K-12 +14%</p>	<p><i>Construction Employment</i></p> <p>Difficult Time Filling Positions +59%</p> <p>Increase Pay to Recruit/Retain +63%</p> <p>Harder to Find Qualified Professionals +78%</p>	<p><i>Contractor Concerns</i></p> <p>Rising Material Costs +32%</p> <p>Rising Subcontractor Costs +32%</p> <p>Increased Competition for Projects +48%</p> <p>Rising Direct Labor Costs +48%</p> <p>Worker Shortages +72%</p>
	<p><i>Contractor Geographic Expansion</i></p> <p>Broaden Geographic Area +46%</p> <p>Maintain Current Geographic Area +50%</p>	

more than a 20 percent net growth. Contrarily, the survey revealed only a net growth of 14 percent in K-12 projects; 30 percent forecast a higher dollar volume of work in K-12, 15 percent predicted lower, and 55 percent expected about the same amount of work, as compared to previous years. ¹²

¹². The Associated General Contractors of America, "2017 Construction Outlook Survey Results National Results," and "2017 Construction Outlook Survey Results Virginia Results"

More locally, the construction industry's focus has been on infrastructure work. According to a 2017 ENR survey of Mid-Atlantic architecture and engineering firms, the infrastructure market is "buoyant." Transportation is the busiest market sector in the area.

¹³. Engineering News Record, "Infrastructure work gives boost to region's design Industry."

However, finding highly qualified key personnel to support his market sector has been challenging.

ENR's survey shows that more than 30 firms identified transportation as their number one producer of revenue. ¹³



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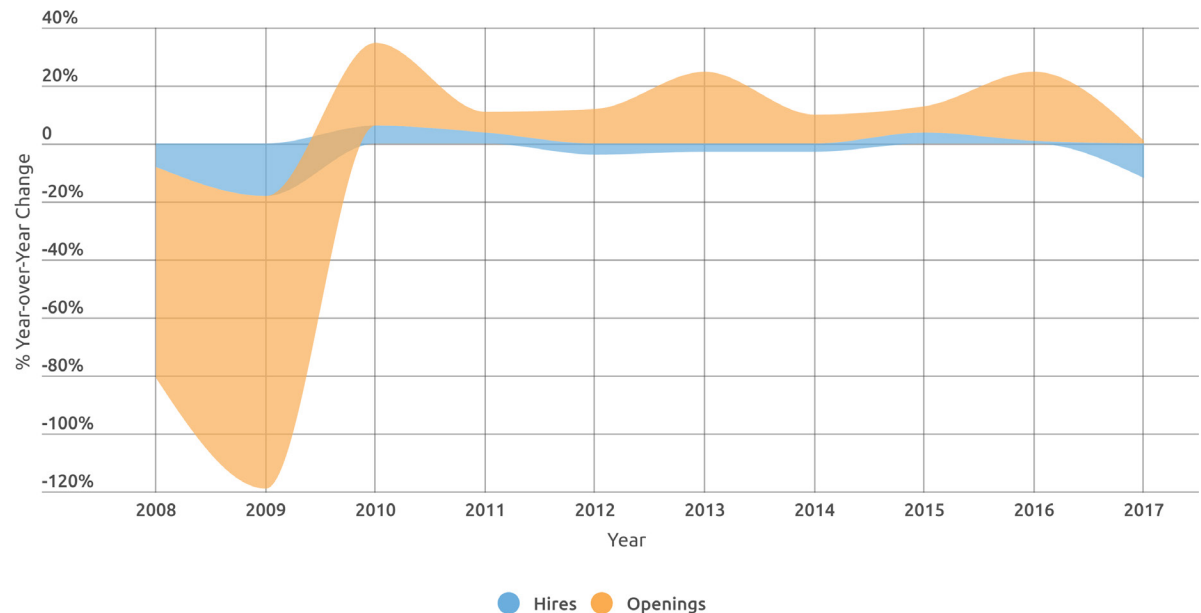
Construction Employment @ Labor Shortages

Since 2008, construction employment in the U.S. and locally in the DMV has not been able to meet the industry's increasing demand for both skilled and unskilled labor.

Over the past seven (7) years, the year-over-year change of available construction jobs has ranged from 29 percent in 2010 to a low of just one (1) percent in 2017.

While the demand for workers has been great, over this same period the number of construction hires has been modest.

- In 2010 and '11, the industry was only able to increase its employment levels by 6 percent and 4 percent, respectively.
- From 2012 to '14, construction hires decreased, year-over-year, from -4 percent to -3 percent, respectively.
- In 2015 and '16, construction employment had returned to positive territory, albeit modestly, increasing by four (4) percent in 2015 and just one (1) percent in 2016.



Source: Bureau of Labor Statistics

Construction Hires vs. Job Openings

2008 - 2017

As illustrated above, even since the end of the Great Recession in 2010, the actual number of construction hires has not been able to meet the need for construction labor, show as the percentage year-over-year change in job openings. The labor shortage has resulted in contractors increasing worker pay (both salaried and hourly employees) to recruit and retain skilled and unskilled workers.¹⁴

¹⁴ Bureau of Economic Analysis, U.S. Department of Commerce

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More locally, since October of 2016, the month-to-month change of construction employment has remained relatively flat. In the DMV, the only state to have experienced a noticeable increase in construction labor is Maryland, employing 162,700 workers in October 2016 and 171,100 in October 2017, a year-over-year increase of approximately five (5) percent.

From October 2016 to '17, the total number of construction workers in the DMV are:

- DC: 14,600 to 14,500
- MD: 162,700 to 171,100
- VA: 190,100 to 192,400

In the Washington, DC suburbs, over this same period, construction employment again reveals only modest gains:

- Washington-Arlington-Alexandria: 158,200 to 163,500
- Silver Spring-Frederick-Rockville: 34,500 to 36,700 ¹⁵

Across the United States, independent observers are continuing to note the challenges of hiring construction labor. In

“As a result, many firms now report that their greatest single challenge is finding qualified workers to hire. In particular, a majority of construction firms that belong to the Associated General Contractors of America report they are having difficulty finding qualified professionals to work in hourly craft positions – the bulk of the construction workforce that includes positions such as carpenters, electricians, laborers and painters.”

2017 ASG Construction Survey ¹⁶



addition to the rising costs of materials (which is discussed later in the market sector report), the costs associated with hiring construction labor is of concern to industry leaders.

According to Ken Simonson, the chief economist at the Associated General Contractors of America (ASG), **“With unemployment so low overall and in construction, many contractors are having trouble filling a variety of hourly craft and salaried openings.”**

ASG conducted a nationwide survey of contractors and released the results in early 2017. With respect to sourcing and filling construction labor:

- 44 percent of contractors reported experiencing “a hard time filling both salaried and craft worker positions.”
- Only 13 percent remarked that they were not having any “trouble filling any positions.”
- And 14 percent said they were “not doing any hiring.” ¹⁷

¹⁵. Bureau of Economic Analysis, U.S. Department of Commerce
¹⁶. The Associated General Contractors of America, “2017 Construction Outlook Survey Results National Results.”

¹⁷. Ibid.

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CONSENSUS FROM THE 2017 AGC OF AMERICA CONTRACTOR SURVEY

“Over the short term, as construction firms struggle to find enough qualified workers, they will be forced to be more selective in the number of projects they seek to perform, lest they find themselves unable to meet contractual obligations because of labor shortfalls.”



“And most firms believe labor shortages will remain difficult, or get even worse, during the next twelve months.”



“And as firms pay more to recruit, retain and train workers, the amount they charge for performing construction work may increase.”



There is no end in sight to the challenges confronting the labor market in the construction industry. According to the 2017 AGC of America survey:

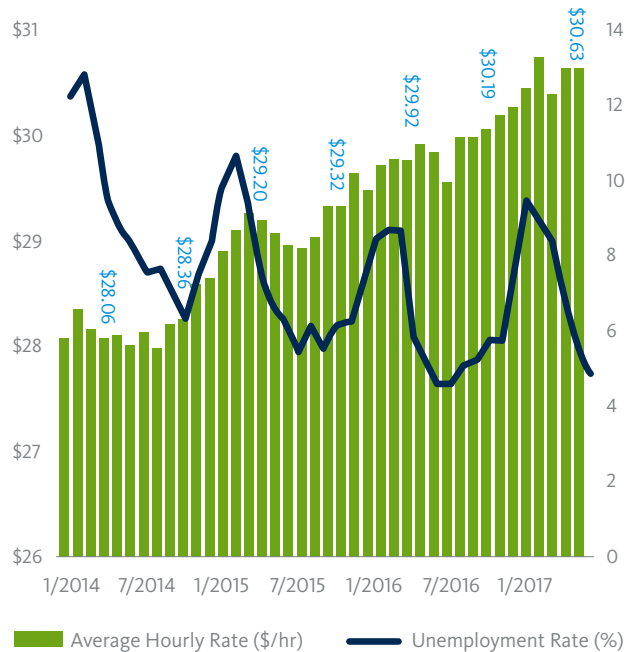
- 67 percent report it will continue to be hard to find hourly craft personnel over the next 12 months.

- Similarly, 50 percent report the same for salaried field and office personnel.
- The primary reason for the industry's pessimism: the current pipeline of recruiting and preparing new workers is low; 74 percent report the new craft worker pipeline as poor or fair.¹⁸

The decline in the number of available – and qualified – construction workers stems, in part, from the nation's economic and education markets re-focusing and re-prioritizing students and workers from craft-based positions (blue collar jobs) to white collar jobs.

¹⁸ The Associated General Contractors of America, “2017 Construction Outlook Survey Results National Results.”

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As illustrated to the left, as the overall unemployment rate in the construction industry has declined, hourly wages have correspondingly increased.¹⁹

WHAT IS THE NET EFFECT?

“In the short-term, fewer firms will be able to bid on construction projects if they are concerned that they will not have enough workers to meet their contractual obligations. If that happens, the cost of construction will likely increase.”²⁰



According to the Chief Executive Officer of AGC, “There are a lot of under-employed Americans who would be much better off working in construction, instead of doing shift work for little more than minimum wage.... It is time to stop stigmatizing jobs like construction because they require workers to use their hands as well as their brains.”

Increasing Construction Labor Market Pay

In the face of low supply and high demand, contractors are paying their workers more.

- The AGC of America survey revealed that a majority (55 percent) said they were providing “higher base pay” to retain or recruit salaried/hourly craft professionals.
- Contractors also remarked that they were providing incentives and bonuses (35 percent) and increasing contributions or improving employee benefits (28 percent).
- The AGC also notes that the construction industry “pays nearly 10 percent more per hour than the

average nonfarm private-sector job in the United States.”²¹

Hourly earnings and the number of weekly hours have both increased. From 2007 to YTD 2017:

- The hourly earnings of construction workers have risen from \$23.01 to \$28.78, representing an increase of 20 percent.
- The average weekly hours of construction workers have gone from 38.9 to 39.6, an increase of 1.7 percent.²²

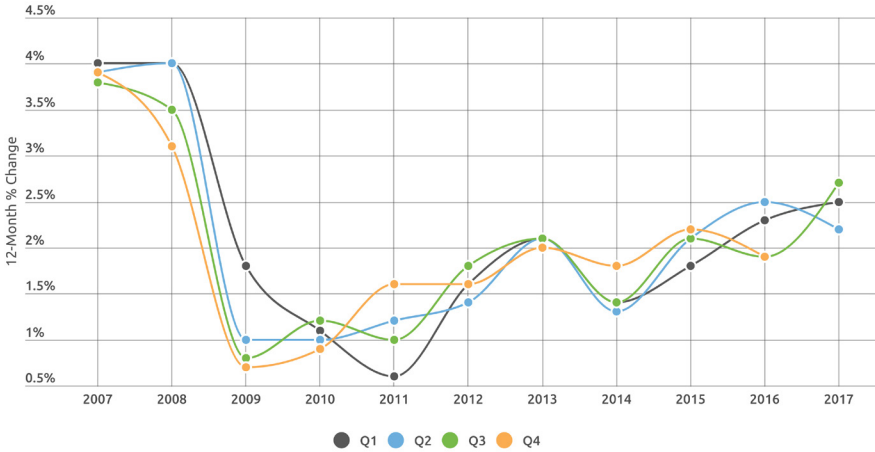
19. Jones Lange LaSalle, “Despite Uncertainty Construction Continues Towards Sustainable Growth.”

20. The Associated General Contractors of America, “2017 Construction Outlook Survey Results National Results.”

21. Ibid.

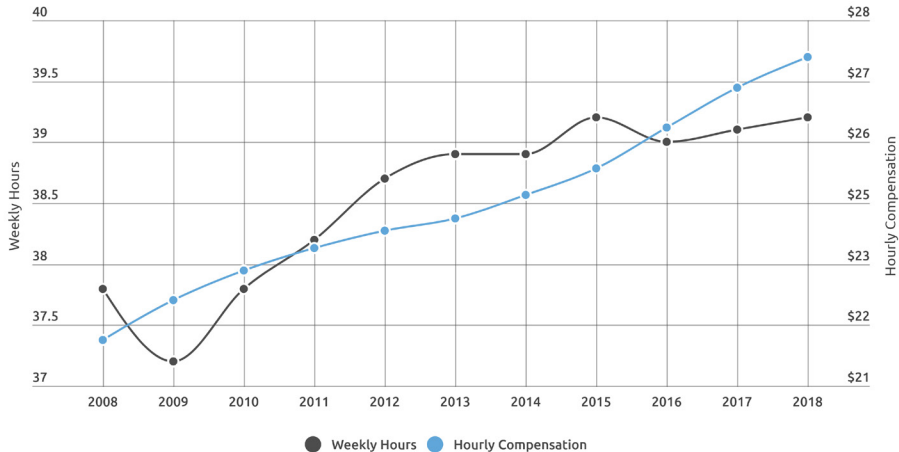
22. Bureau of Economic Analysis, U.S. Department of Commerce

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Source: Bureau of Labor Statistics

Construction Worker Compensation 2007-2017



Source: Bureau of Labor Statistics

Construction Worker Weekly Hours & Hourly Compensation

For the past ten (10) years, construction worker compensation has increased year-over-year, a cumulative increase of 20 percent. As worker pay has risen, so too has the average number of weekly hours worked per laborer. As 35 percent of the total cost of construction is represented by labor costs, the end result will be continued rising project prices.²³

While construction laborers are working longer hours, most significantly they are earning more. As previously demonstrated, 35 percent of the total cost of construction is labor costs. **Moreover, the overall costs of construction projects will continue to rise, year-over-year, because of higher worker pay.**

Rising Costs in Key Construction Materials

The most significant effect of the total price of a construction project is the cost of construction materials, representing 40 percent of a project's cost.

“The cost of materials used in construction rose markedly faster than the price of

completed buildings,” according to an analysis of federal producer price data released by AGC.²⁴

The association's chief economist, Ken Simonson, remarks, “Steep price hikes have hit a wide range of key materials used in construction ... and contractors have

23. Bureau of Economic Analysis, U.S. Department of Commerce
 24. The Associated General Contractors of America, “Construction Firms Getting Squeezed by Increasing Materials & Labor Costs and Slower Increases in What They Charge to Build Projects.”



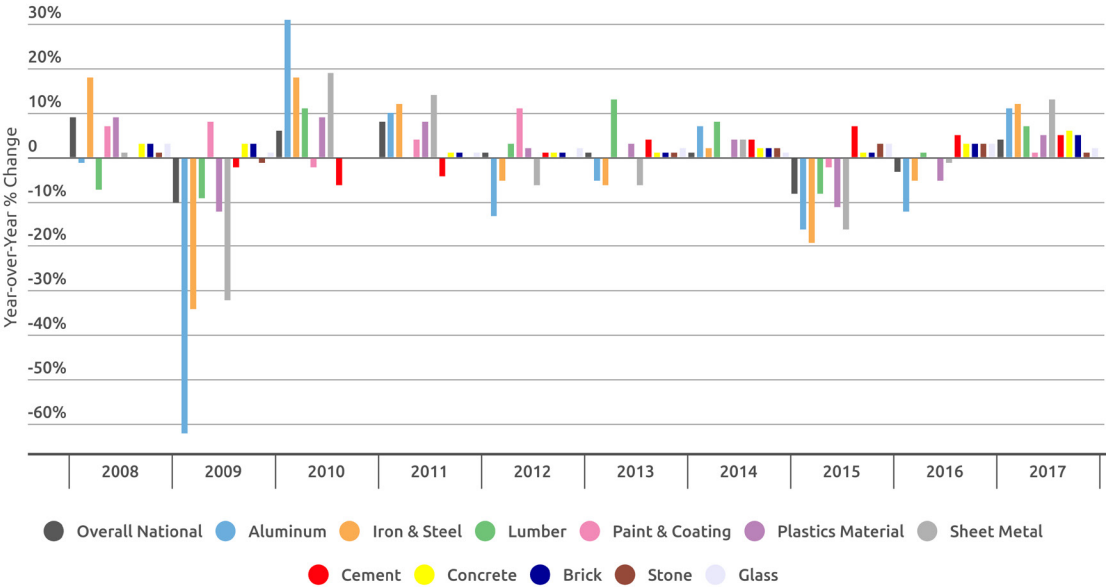
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received numerous letters from vendors announcing large additional increases in the next month or two.... For the most part, contractors cannot pass these costs along on projects already underway, and the data show they are not yet able to price new buildings at a level that reflects their rising materials and labor costs.”²⁵

The Producer Price Index (PPI), provided by the Bureau of Labor Statistics, measures the overall changes in prices received for the construction industry’s output, encompassing materials, equipment, labor, etc. In addition, the PPI specifically measures the changes in prices for the construction industry’s materials.



Analysis of both classification structures related to the construction sector of the economy further supports the general industry consensus that prices of services and materials are continuing to increase. From January 2016 to January 2017, the PPI reveals an overall 3.8 percent increase in the price of construction materials.



Source: Bureau of Labor Statistics & St. Louis Federal Reserve

Producer Price Index Avg, Last 10 Years

The Producer Price Index (PPI) measures the average change over time in the selling prices of products, or materials, received by producers. As the above chart illustrates, the industry is experiencing cost increases for all major construction materials, further underscoring the conclusion that overall construction costs will continue to rise.²⁶

25. The Associated General Contractors of America, “Construction Firms Getting Squeezed by Increasing Materials & Labor Costs and Slower Increases in What They Charge to Build Projects.”
 26. Bureau of Economic Analysis, U.S. Department of Commerce



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The major contributors to these price increases derive from:

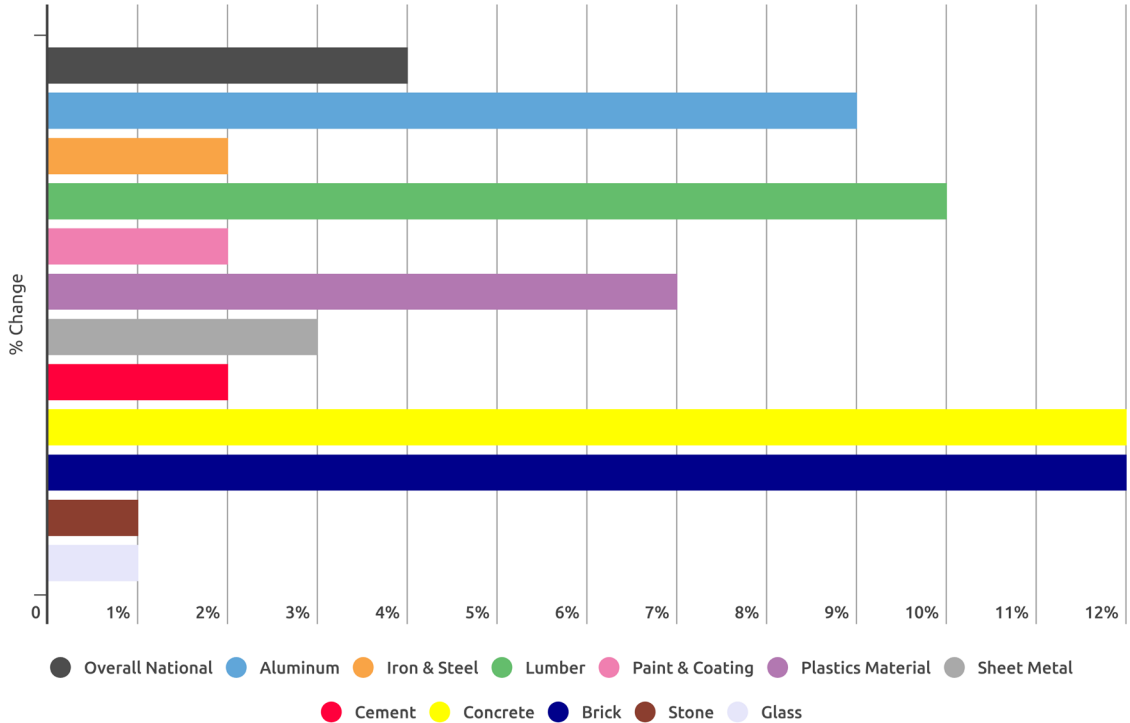
- Copper & Brass Mills – 19.9%
- Steel Mill Products – 11.4%
- Lumber & Plywood – 3.7%



Further, diesel fuel has risen by 42.6 percent year-over-year. The significance of this increase is that contractors use diesel to transport construction materials to and from job sites.²⁷

Moreover, the YTD PPI of the most frequently used construction materials underscores dramatic price increases – nearly all above the national average of four (4) percent. Notable results include:

- Brick – 12%
- Concrete – 12%
- Lumber – 10%
- Aluminum – 9%
- Plastics – 7%²⁸

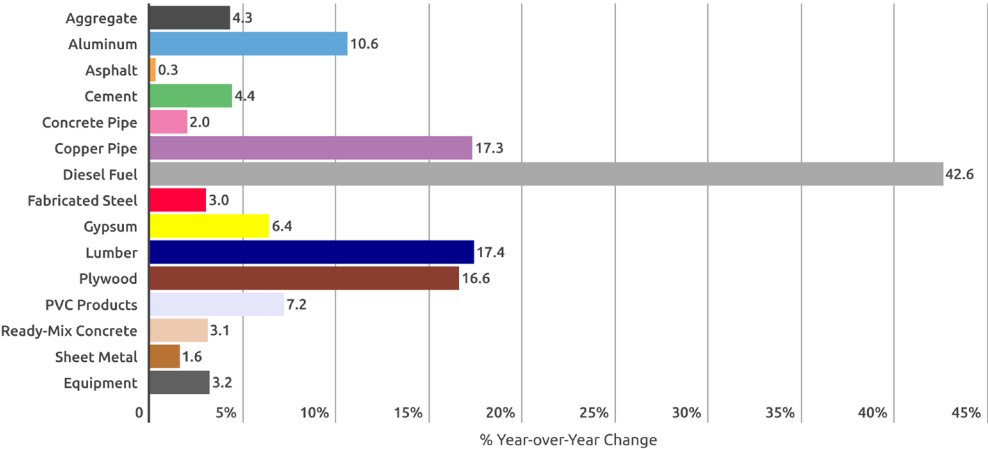


Prices of major construction materials have experienced recent and notable increases. The above graphic shows the percentage of these cost increases since the start of 2017.²⁹

27. The Associated General Contractors of America, "Construction Firms Getting Squeezed by Increasing Materials & Labor Costs and Slower Increases in What They Charge to Build Projects."
 28. Bureau of Economic Analysis, U.S. Department of Commerce

29. Ibid.

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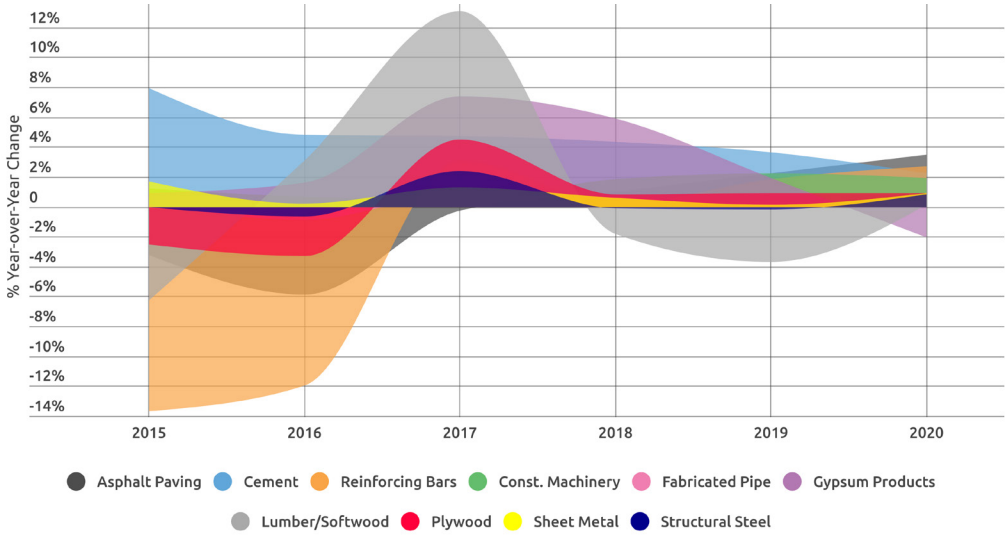


Source: Engineering News-Record, Bureau of Labor Statistics

Construction Materials Price Movement

2016 - 2017

The year-over-year price increases of major construction materials averages 4.3 percent from 2016 -2017. Significant rises of costs in diesel fuel, copper, lumber, plywood, and aluminum have mostly driven these increases.³⁰



Based on past construction data and industry analysis, ENR forecasts the material price inflation of major construction materials through 2020. As illustrated to the right, the average year-over-year change in cost is expected to increase between 2 and 4 percent for most major materials.³¹

Source: Engineering News-Record, IHS Global Inc.

Material Price Inflation Through 2020

2015 - 2020

30. Engineering News Record
31. Ibid.




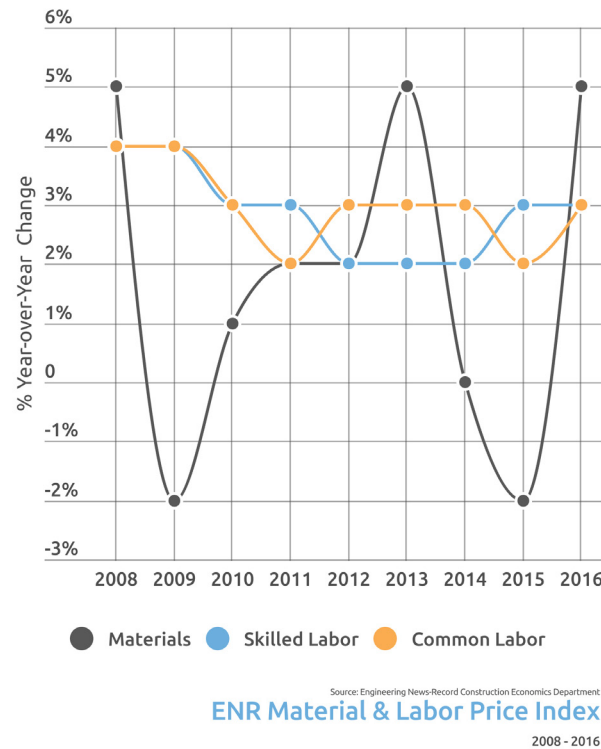
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There are several reasons behind the rising costs of construction materials. In addition to the challenges of supply and demand (not enough production of the materials versus the need to meet the demand of the industry), the political reality regarding the country's trade policies have created uncertainty in the marketplace.

In its mid-year analysis of the construction industry, JLL concludes that the rising costs of construction materials have mostly been because of “political rhetoric around changing trade policy” versus the “steady demand for materials.”

The White House's debate on ending or renegotiating trade agreements, such as NAFTA and CAFTA, and imposing tariffs on trading partners like China and other Asian countries have “had profound impacts on the accessibility of materials.” JLL concludes: “This is directly affecting the pricing we're seeing today.”

 According to JLL, over the past 12 years, “material costs have grown by nearly 30 percent.”



 The net effect of consistent increases in materials and labor costs underscore the overall persistent rise of the overall total cost of construction, as illustrated previously.²¹

- “For example, \$500,000 worth of [construction] materials in 2015 would cost \$650,000 today.”
- Approximately 10 percent of these costs have grown within the past five years.³¹
- Engineering News Record (ENR) reports that the costs of construction materials have risen by a net seven (7) percent, going from -2 percent in 2015 to 5 percent in 2016.³³

31. Jones Lange LaSalle, “Despite Uncertainty Construction Continues Towards Sustainable Growth.”
 32. Engineering News Record
 33. Ibid.

3 | APPENDICES



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