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MEMORANDUM

DATE: February 10, 2023

TO: Maisa Tisdale
The Mary & Eliza Freeman Center for History and Community

FROM: Synfoni Bailey-Green

RE: Mary and Eliza Freeman Houses
Understanding of Construction Industry Cost Increases in Recent Years

We understand the recent bid/GMP amounts for the Mary & Eliza Freeman Houses project have exceeded initial cost budget/estimate amounts. Initial Rough Order of Magnitude Opinions of Probable Construction Costs (ROM-OPCC) were prepared by NCA in late 2018 to assist the Owner in development of their cost budget. The unit cost amounts in the initial ROM-OPCC were based upon actual costs observed on current projects in the area, as well as RS Means, using 2018 data. In 2019, we updated the ROM-OPCC and the amount of construction increased based upon the price increases seen to that date. Over the course of the project and the finalization of our design documents, a few scope items were expanded and therefore some line items increased. We included escalations amount as we understood the project would require an expanded review and approval process, and would span multiple years of phased construction.

March 2020 witnessed the onset of the global COVID-19 pandemic and its long-standing and deep-rooted impact on the construction industry. While there were initial fluctuations in construction cost estimating and subsequent bid results, the full effect was not realized until major construction segments were deeply affected by manufacturing delays, shipping delays, and labor shortages. One item to point out here is that certain contractors with a significant experience in historic structures of this type had indicated they might not be able to take on the project due to some of these challenges. Further, broader economic inflation beginning in early 2022 has added to an already strained condition for the construction industry.



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In August 2022, this project solicited bids that were over budget. While it can be stated and supported that construction costs throughout the nation have been adversely affected by the combined effects of the pandemic and inflation (see attached published reports, including summary articles by JLL and CBRE), we have seen specific local examples to note similar percentage increases:

- 347 Prospect Street, Willimantic, CT (Historic Residence Renovation for Eastern Connecticut State University):
 - Initial Budget Provided by the State of CT: (Apr, 2021): \$525,000
 - 3rd Party Cost Estimate at Schematic Design (Aug, 2022): \$1,612,595
- 55 Brown Street, Wickford, RI (Historic Commercial Building for private client):
 - Initial Budget: \$3,496,785 (Jan, 2020)
 - CM GMP: \$5,129,241 (Mar 2022)
- Eisenhower Pool and Pool House Renovation (Town of West Hartford)
 - Initial estimate by 3rd party: \$2,600,000 (April, 2022)
 - Lump Sum Apparent Low-Bid: \$4,409,074 (September, 2022)

NCA has adjusted our ROM-OPCC estimating data since this information became apparent in late summer of 2022, and 4 of our 5 most recent projects have bid within 10% of ROOM-OPCC and/or 3rd party estimate (the one that did not was a fast-track project with only 2 qualified bids).



FALL 2021

Surging Construction Costs: Implications for Commercial Real Estate

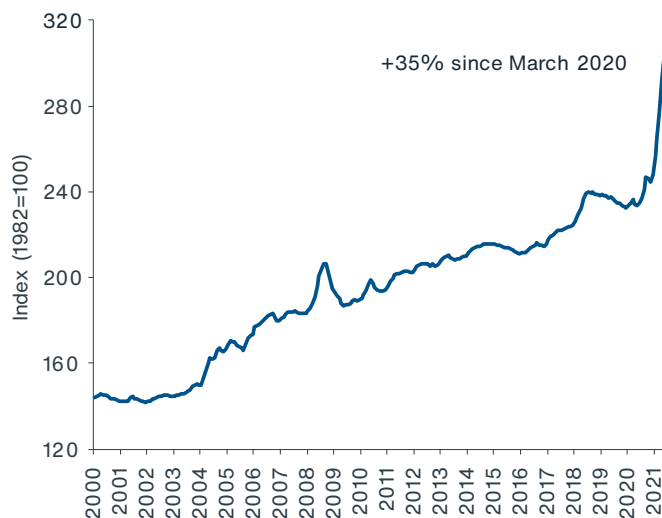
TIM WANG AND JULIA LAUMONT

INTRODUCTION

In the year that followed the onset of the global COVID-19 pandemic, there was an unprecedented surge in construction costs. Nationwide, building materials rose at the fastest pace in a decade from March 2020 to September 2021 (*Figure 1*). Many key construction material prices climbed rapidly, in particular, lumber, metals, and plastic products (*Figure 2*).¹ Subsequently, commercial real estate (CRE) development and renovation costs rose significantly, and many planned projects have experienced sizable budget increases and substantial delays.

According to a recent survey by the National Multifamily Housing Council (NMHC), 93% of the largest U.S. multifamily construction companies have experienced steep material price increases and a lack of available construction supplies.² In recent months, some commodity prices had slightly improved; however, overall building costs remained elevated, up by approximately 35% from early 2020.³ The sharp increase in construction costs is having profound impacts on both new development projects and existing CRE assets.

FIGURE 1: PRODUCER PRICE INDEX (PPI) FOR CONSTRUCTION MATERIALS (2000-2021)

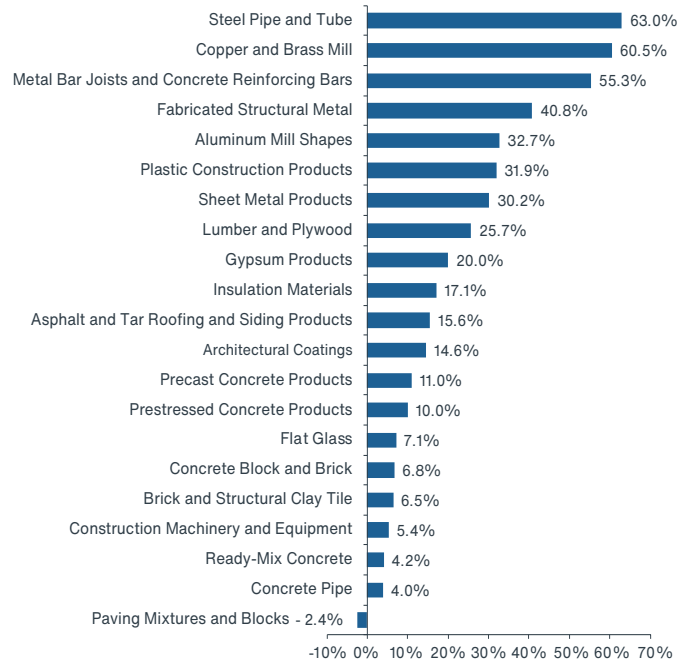


Source: U.S. Bureau of Labor Statistics, Clarion Partners Investment Research, September 2021.



Alexandria, Virginia

FIGURE 2: CONSTRUCTION MATERIALS PRICE MOVEMENT (MARCH 2020-AUGUST 2021)



Source: U.S. Bureau of Labor Statistics, Clarion Partners Investment Research, September 2021.⁴

CAUSES OF COST INCREASES

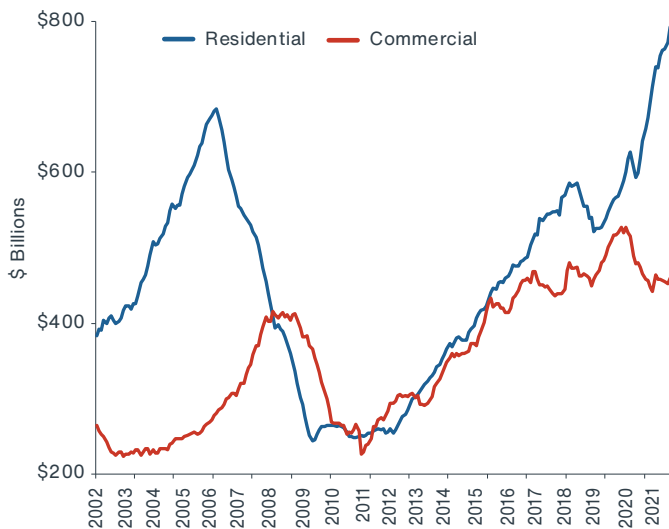
The rapid run-up in construction prices may be attributed to several factors that were caused or exacerbated by the pandemic:

- **Pandemic-Induced Supply Chain Disruptions.** The onset of the global COVID-19 pandemic precipitated a rapid and unexpected demand shock in 2020. Suppliers scaled back production dramatically because of COVID-related concerns and in response to weaker demand. Across international markets, there were severe disruptions in labor, production, and transportation, which led to widespread inventory shortages into 2021 as demand rebounded sharply. More recently, there has been a surge in shipping demand, causing widespread and prolonged delays at major U.S. ports. Global supply chain bottlenecks are exacerbating shortages of components and leading to surging prices of critical raw materials, squeezing manufacturers and retailers around the world.⁵
- **Synchronized Global Recovery.** After a short-lived yet steep recession in 1H 2020 that interrupted normal business conditions, a synchronized global economic recovery, or demand comeback, is now underway. In Q3 2021, U.S. total retail sales climbed to the highest level on record. A faster-than-expected domestic recovery has resulted in acute imbalances between demand and supply due to the gradual revamping of production capacity and rehiring of skilled workers.

- **For-Sale Housing & Home Improvement Boom.** Partially driven by the pandemic and people's desires for less density and more living space, new and existing U.S. home sales reached a 15-year high in 2020 and have since remained near that level every quarter.⁶ At the same time, for-sale housing inventory has stayed near all-time lows through Q3 2021.⁷ Nationwide, housing starts have also been running at the highest levels since the mid-2000s.⁸ Furthermore, private residential investment, measured by spending on building materials and home furnishings, soared by over 20% from Q4 2019 to Q2 2021, as many Americans invested more in home renovations and expansions during lockdowns and increased remote work.⁹
- **Commodity Market Speculation.** As the prices for construction materials surged, some suppliers and developers stocked up inventories to hedge further price increases, which may have exacerbated the demand and supply imbalance. Furthermore, some commodity investors bought futures contracts to try to profit from the price run-ups.
- **Higher Construction Wages & Labor Shortages.** Over the past decade, U.S. labor costs have continued to climb and accelerated significantly in the last year. Construction wages have picked up in the past year, up by 5.8% year-over-year in September 2021 (well-above the 10-year average of 2.2%).¹⁰ In recent years, the CRE industry in general has experienced a labor shortage, in particular of skilled labor, which intensified during the pandemic. The U.S. construction unemployment rate dipped to 4.6% in August.¹¹

Over the past two years, residential construction spending has skyrocketed while commercial construction spending, including most "non-residential" property, declined (*Figure 3*). This comes as most commercial sectors, such as office, retail, and hotels, have reported more muted absorption levels, while those of industrial, multifamily, and life sciences have remained robust. At the same time, demand for all forms of residential for-sale housing has remained very strong, as there continues to be a shortage of high-quality and affordable housing in many parts of the country, as more and more live in a broader mix of living arrangements and locations amidst favorable demographic tailwinds.

FIGURE 3: RESIDENTIAL & COMMERCIAL CONSTRUCTION SPENDING, 2002-2021¹²



Source: U.S. Census Bureau, Clarion Partners Investment Research, August 2021.

IMPACT ON THE CRE INDUSTRY

Overall, higher construction prices have mainly impacted the overall CRE industry in four ways, which may continue in the near future.

- Tighter margins on new development and renovations;
- Project budget overruns and delays; according to a recent survey by the International Data Corporation (IDC), 78% CRE owners were over budget on construction projects and were an average of 70 days late on projects;¹³
- More moderate development pipelines, largely excluding multifamily and industrial; and,
- More room for rent growth and appreciation at existing properties due to higher replacement costs.

However, the anticipated effect on Clarion Partners' target overweight sectors varies considerably based on current supply and demand dynamics.

Industrial: With vacancy near all-time lows and absorption at record highs, industrial demand has remained extraordinarily robust over recent years and throughout the pandemic.

Residential: With the recent strengthening of home property values, single-family home builders also have a greater ability to pass on the increasing financial burden to buyers through higher purchase prices. On the other hand, stick-built low-rise and garden-style multifamily have been more impacted by the recent spike in lumber prices, while high-rise multifamily was less affected, as lumber is less of a key building material for this format. While the recent decline of lumber prices is welcoming new development, overall construction costs for multifamily remain elevated.

PROPOSED INFRASTRUCTURE SPENDING

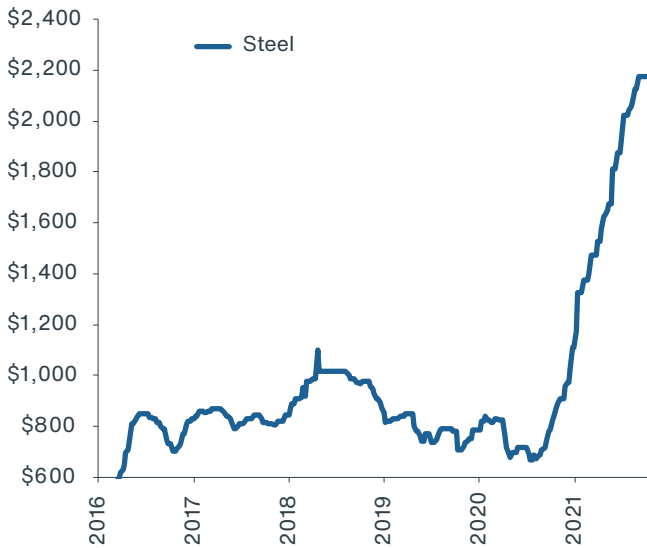
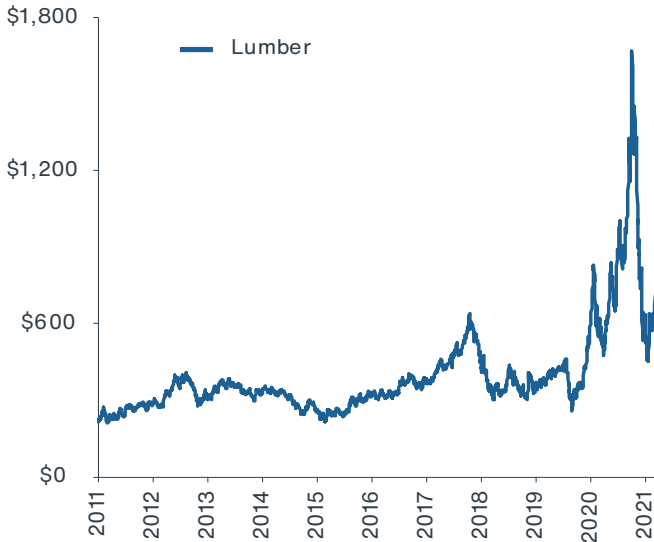
In the years ahead, there may not be a significant correction in the recent run-up in construction prices if supply chain disruptions remain and the infrastructure spending legislation is approved. The Biden administration's massive infrastructure plan is likely to have a major impact on construction costs over the outlined five- to eight-year spending period, impacting both material and labor costs nationwide. The planned \$1.2 trillion "Bipartisan Infrastructure Framework" is expected to make large-scale investments in clean air, water, and transit infrastructure.¹⁴ The program will direct billions of dollars towards major clean energy and transportation initiatives, universal broadband infrastructure, cleanup of legacy pollution, and environmental remediation programs.

Other considerations or potential risks that may impact the construction supply/demand outlook include: new COVID variants, tariff/trade policy, the pace of Chinese economic growth, and new construction technologies that may achieve greater economies of scale in production.

OUTLOOK: CONSTRUCTION COST PRESSURES LIKELY TO STABILIZE BUT STILL REMAIN ELEVATED

Looking forward, construction costs may moderate as production and supply chain disruptions ease. Historically, commodity prices have been volatile with large swings. For example, lumber spot prices rose almost threefold to a record of \$1,670 per thousand board feet in May 2021; however, prices have plummeted in recent months to below \$600 per thousand board feet as sawmills ramped up production and some suppliers began to sell their lumber inventory (*Figure 4*). Nonetheless, as of Q3 2021, pricing for many key construction materials remained elevated, as global production and supply levels had not universally improved.¹⁵ For example, prices remain well above prior peaks for steel and aluminum.

FIGURE 4: LUMBER, STEEL, & ALUMINUM SPOT PRICE



Source: Nasdaq, Clarion Partners Investment Research, October 2021. Note: Spot price data on a daily frequency through 10/13/2021 and steel is based on cold rolled coil steel. Units are: lumber = \$/BFT (\$ per board foot), aluminum = \$ per ounce, and steel = \$ per ton.

This does not constitute investment advice. All information has been developed by Clarion Partners or obtained from sources that Clarion Partners believes to be reliable. This material is not an offer to sell or a solicitation of an offer to buy any security. Investment in real estate involves significant risk. Investors should consider their investment objectives and their risk tolerance before investing. Past performance is not an indication of future results.

CONCLUSION

The unprecedented surge in construction costs is having a significant impact on both new and existing CRE. Higher commodity prices, supply chain disruptions, a shortage of desirable development sites, and a tight labor market can make development and renovation projects more expensive and cause substantial delays. On the positive side, owners of existing properties should have a greater ability to maintain and increase rents amidst rising replacement costs and a manageable supply pipeline, which may further boost asset appreciation going forward.

Nonetheless, there is likely to be ongoing and tremendous demand for institutional-quality or “Class A” space, while there is still widespread functional obsolescence across the CRE investable universe, which will justify new development. Given higher building costs in the near-term, Clarion Partners recommends targeting property sectors with the highest demand (e.g. rental housing, logistics property, and life sciences facilities) and markets/submarkets with the most acute supply constraints, where landlords have the leverage to grow rents.



Alexandria, Virginia

¹ U.S. Bureau of Labor Statistics, Clarion Partners Investment Research. Q3 2021. Note: Data displayed is not seasonally adjusted producer price index.

² NMHC. September 2021.

³ U.S. Bureau of Labor Statistics. October 2021. Note: Based on Producer Price Index by Commodity: Construction (Partial): New Nonresidential Building Construction, Index June 2009=100.

⁴ Ibid.

⁵ *WSJ. Global Supply-Chain Problems Escalate, Threatening Economic Recovery.* October 2021.

⁶ Ibid.

⁷ Ibid.

⁸ Moody's Analytics. October 2021.

⁹ U.S. Census Bureau, U.S. Bureau of Economic Analysis. October 2021.

¹⁰ U.S. Bureau of Labor Statistics. October 2021.

¹¹ Ibid.

¹² U.S. Census Bureau, Clarion Partners Investment Research. October 2021. Note: 1) Nonresidential construction (labeled as commercial in chart) spending covers construction work done each month on new structures or improvements to existing structures for private sectors. 2) All nonresidential building types included in the data, but not limited to are offices, hotels, retail, warehouses, health care, infrastructure, education, recreational, and manufacturing. 3) Residential construction spending is construction work done each month on new structures or improvements to existing structures including, but not limited to single-family homes or apartments buildings.

¹³ *BusinessWire. 78% of Corporate and Public Real Estate Owners Over Budget on Construction Projects: IDC Survey.* August 2021.

¹⁴ www.whitehouse.gov. June 2021.

¹⁵ U.S. Bureau of Labor Statistics, Clarion Partners Investment Research. October 2021.



United States | H1 2022

Research

Construction Outlook

Recovery into conflict

Executive summary

Broad economic recovery and a near-global end to pandemic-related restrictions generated an improved construction outlook in the early months of 2022. However, lingering supply chain issues, international geopolitical conflicts, and elevated inflation have further stymied material availability and elevated costs. As these combine with continuing labor difficulties and forthcoming interest rate increases, construction volume may not recover at initially anticipated rates.

While unemployment rates have returned to near pre-pandemic levels, total employment in the construction industry has only just returned to pre-pandemic numbers and job openings are at record highs. Labor markets remain extremely tight in general.

Following unprecedented volatility in materials pricing in the last year, costs remain at historically high levels and face additional uncertainty. Continuing record inflation and extreme energy prices, the latter brought on by the invasion of Ukraine by Russian forces and subsequent sanctions against Russia, are likely to further drive record price increases for construction materials and to complicate global supply chain recovery.



Andrew Volz
Construction
Research Lead

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State of the industry

While many cities have lifted restrictions and reopened economies following the latest COVID-19 surges, the construction industry continues to struggle with the supply chain disruptions and labor shortages that rose to the forefront in 2021. These two most-affected areas for the construction industry, labor and materials, are experiencing long-term shifts that will continue well beyond the pandemic's resolution. Additionally, new geopolitical conflicts have the potential to complicate recovery, especially around already fragile supply chains. Although predictions for 2022 have been positive, considerable uncertainty remains and forecasts will require revision.

Construction stats

Construction employment

- Unemployment rate:
February 2022: **6.7%** | February 2021: **9.6%**
- Total employment:
February 2022: **7.6M** | February 2021: **7.3M**
Change: **+4.2%**

Construction costs

- Labor wages: **+6.0%** Feb. 2021 to Feb. 2022
- Material costs: **+21.2%** Feb. 2021 to Feb. 2022
- Total costs: **+11.7%** Q4 2020 to Q4 2021

Construction spending

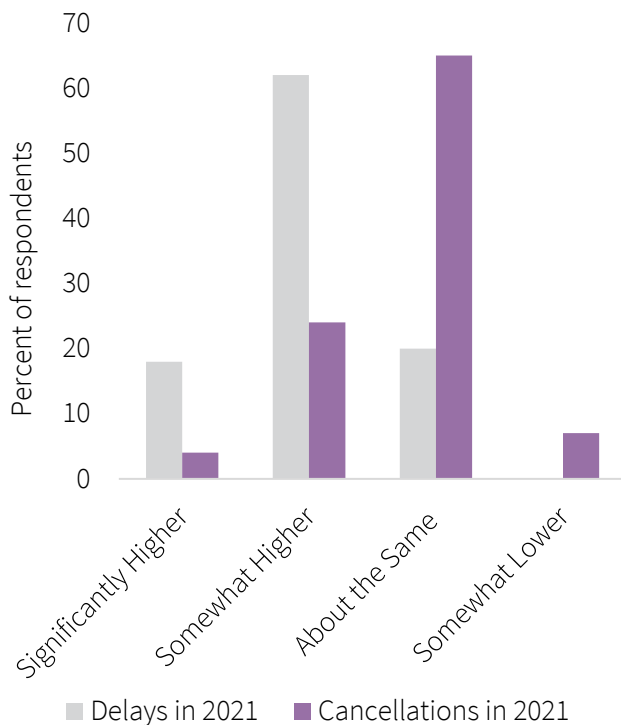
- Nonresidential: **-18.5%** Jan. 2021 to Jan. 2022
- Residential: **-13.2%** Jan. 2021 to Jan. 2022

Sources: JLL Research, U.S. Bureau of Labor Statistics, U.S. Census Bureau

Materials and labor availability continue to hinder construction

Delays have become increasingly common since the start of the pandemic, with the source shifting from initial owner- and government-led decisions to supply chain and labor issues. According to the Construction Industry Round Table, roughly 80 percent of firms reported delays either somewhat higher or significantly higher than pre-pandemic years, while the remaining 20 percent reported similar delays to pre-pandemic times. However, most firms report cancellations returning to pre-pandemic rates. With stable backlogs heading into 2022 despite rising costs and constraints on material availability, construction firms are looking to increase hiring and build capacity.

Frequency of delays and cancellations



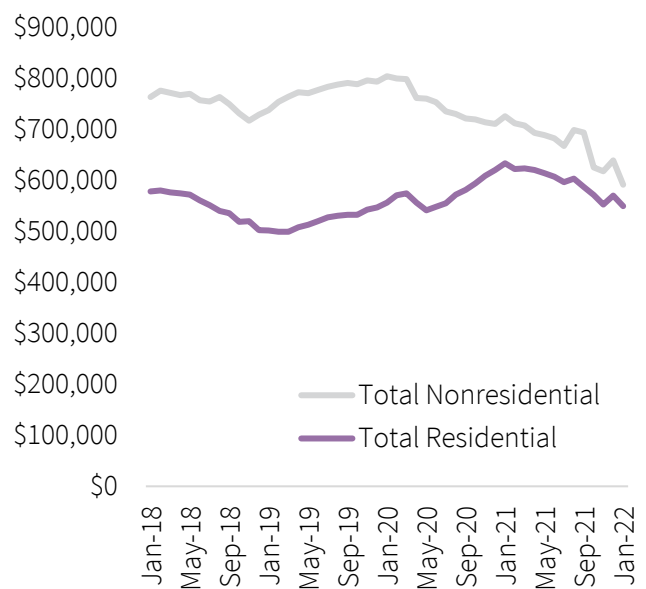
Source: Construction Industry Round Table

Construction spending continues to slide

Declines in both residential and nonresidential construction spending have continued into 2022 on an inflation-adjusted basis. Nonresidential construction spending hit a record low in January 2022, and residential construction spending has fallen to near early-pandemic levels. While residential demand remains strong, increasing interest rates may dampen the viability of construction over the near term. Nonresidential construction continues to see positive projections but lacks concrete time frames for full recovery. Delayed return-to-office plans and larger, active conversations around the future of work and patterns of living continue to sideline projects. Other indicators such as the Architectural Billings Index suggest demand for new construction work is strong, but cost instability and availability issues will limit total volume.

Monthly U.S. construction spending

(inflation adjusted, seasonally adjusted annual rate, millions)



Sources: JLL Research, U.S. Census Bureau

Key forecasts from the H1 2022 Construction Outlook

1.

Total construction costs:

Several major sources of uncertainty amid high demand are likely to keep construction costs growing at a rapid pace over the course of 2022. The net effect will be yet another above-average year of total construction cost growth, forecast to increase 8 to 12 percent over the next 12 months.

2.

Construction labor costs:

A recent surge in hiring has put national construction employment within 1 percent of pre-pandemic levels and further dropped industry-wide unemployment. Hiring has come at a high price, with average wages increasing by 6 percent year-over-year or the highest rate recorded in 40 years. Looking ahead to the next year, construction labor costs will continue to grow at a similar elevated rate. Continued labor shortages, heightened demand and elevated inflation are likely to drive wage increases in the 4 to 6 percent range.

3.

Construction material costs:

Intense demand and continuing supply chain issues are likely to keep select materials costs growing rapidly. Materials costs are the lowest-confidence forecast due to the wide range of inputs and global supply chains bucketed into a single category. The net impact will be a wide range of price changes for individual materials, with an average increase across all materials in the 10 to 12 percent range expected.

4.

Construction volume:

Inflation-adjusted nonresidential and residential construction spending has declined consistently since the pandemic began, driven downward by fewer new project starts 2021. As new variants of the COVID-19 virus emerged, expectations of full recovery have been frustrated and pushed back, with the most harmed sectors not expected to return to pre-pandemic volume until 2023 in optimistic forecasts.

5.

Political implications:

Following the passage of the \$1.2 billion Infrastructure Investment and Jobs Act (IIJA) in late 2021, as well as a potential \$555 million climate change bill, the construction industry is primed to see a boon as funds begin to flow in the coming years.

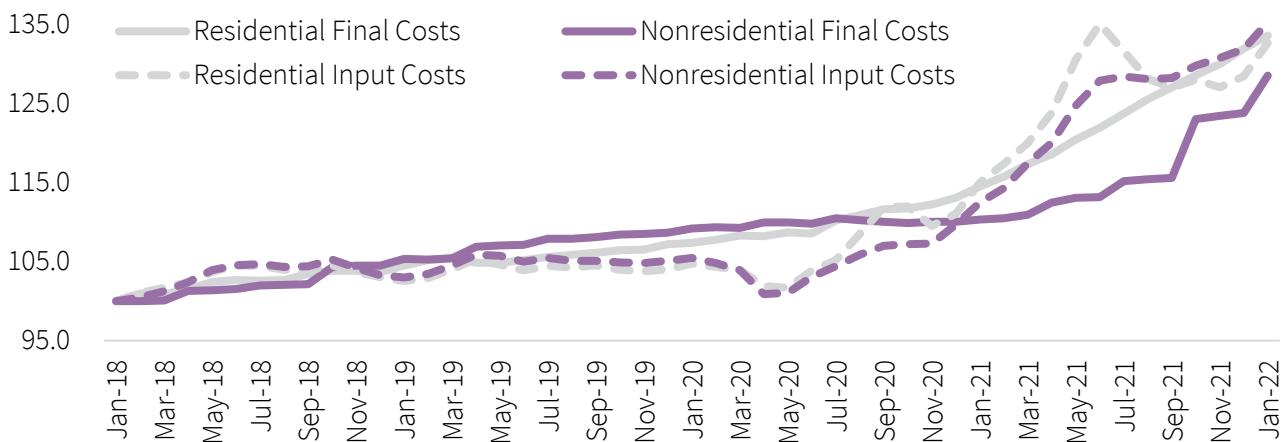
- The IIJA includes allowances for increased public-private partnership spending on road and bridge projects that will have cascading effects on commercial development.
- The bill also allocates funds toward workforce and other training, with the potential to shore up the current below-replacement-level entry into the construction workforce.

1. Total construction cost update

Unprecedented growth in material input prices still has not been fully incorporated into bids in nonresidential projects and has been unstable for residential construction. Relatively weak nonresidential demand due to the COVID-19 pandemic has held down the costs that can be passed on to final clients. The data also shows how residential costs have trended above nonresidential costs but for a brief slowdown in mid-2021 attributable to relaxing lumber prices. However, lumber prices have risen rapidly, and inputs are once again approaching final costs. Overall, above-average cost increases should be expected in 2022.

Construction costs: Input vs. Final by building type

Construction cost index (index value 100 = Jan. 2018)



Sources: JLL Research, U.S. Bureau of Labor Statistics

The lingering factor, as depicted in the chart above, is that most of the material costs increases from the past 18 months have not been passed through to final nonresidential bid prices yet and may overtake the residential side again. As demand for new projects continues to grow and contractor backlogs increase, there will be less incentive to bid aggressively, and contractors will aim to pass through cost increases to the owners as soon as the market can bear it. This combination of factors leads us to extend our forecasts for 8 to 12 percent final cost growth for nonresidential construction in calendar-year 2022.

2. Construction materials update

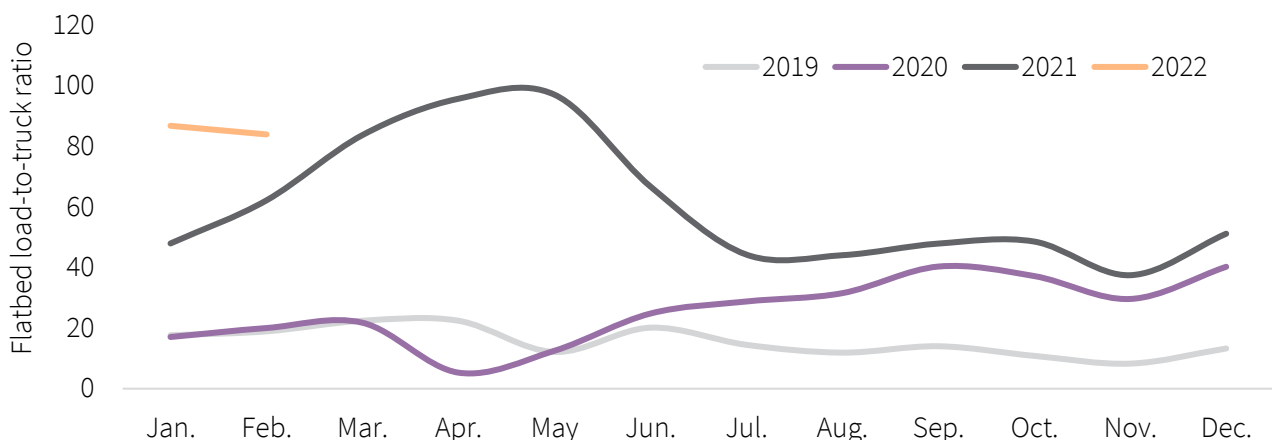
Exceptional price increases in materials have continued into the start of 2022, and expectations for general stabilization have been delayed due to geopolitical conflict, the lingering threat of new COVID-19 variants and unforeseen global circumstances. Lumber specifically has had an extremely volatile year, recording a rapid fall and a period of stabilization in mid- to late 2021, followed by an extreme increase at the end of the year due to a combination of mudslides in British Columbia, Canada, hindering international production, and U.S. demand spiking in anticipation of increasing tariffs. All other major construction inputs, except for flat glass and concrete, saw year-over-year price increases around 20 percent or above, with steel beginning to stabilize at a 74.4 percent year-over-year increase.

Aside from costs, the most pressing issue for most construction materials right now is lead times and

delays. Hopes for major relief during 2021 did not materialize, and new sources of uncertainty may further complicate supply chains. Resultantly, most materials are seeing lead times increase further relative to late 2021 and inventories contract, with most materials moving from a lead time measured in weeks to one measured in months.

Geopolitics will also play an outside role in construction material cost and availability. U.S. tariffs remain in place, and the Russian invasion of Ukraine has severely disrupted energy supplies across Europe and, to a lesser extent, the globe. Rerouting commercial and cargo traffic around Russia will see lead times and costs for international goods increase and add further strain to energy supplies. Longer term, both Ukraine's and Russia's positions as major sources of noble gases and rare earth minerals may damage production of computer chips and batteries.


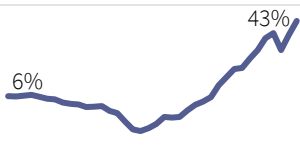



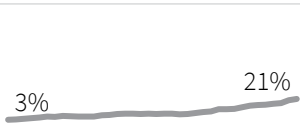



Domestic flatbed truck demand



Source: DAT Freight and Analytics

Construction materials cost and volatility data

The table below analyzes the recent cost history of nine major types of construction materials over the past decade. The materials are ranked by historical cost volatility over the past 30 years, with the least volatile materials at the top and the most volatile at the bottom. Although forecasts for any month or year may swing, measuring differences in volatility is key to developing an accurate forecast and a project budget that correctly accounts for potential cost risk.

	Volatility rank (1 = most volatile)	Material	Quick chart (4-yr.)	10-yr. avg. change	3-yr. avg. change	1-yr. avg. change	Lead times
Low volatility	9	Flat glass		+3.23%	+4.43%	+10.05%	Slight increase
	8	Aluminum mill products		+3.98%	+8.48%	+32.74%	Stabilizing
	7	Insulation materials		+4.05%	+7.57%	+17.85%	Increased
	6	Lumber and plywood		+9.22%	+23.90%	+22.54%	Stabilizing
Medium volatility	5	Plastic construction products		+4.94%	+13.23%	+35.63%	Increased
	4	Concrete		+3.84%	+5.26%	+9.98%	Increased
	3	Steel mill products		+6.24%	+22.84%	+74.42%	Increased
High volatility	2	Gypsum products		+6.05%	+7.86%	+20.70%	Increased
	1	Copper and brass products		+3.21%	+15.46%	+24.44%	Slight increase

Sources: U.S. Bureau of Labor Statistics Producer Price Index, local market research



3. Construction labor update

Persistent labor challenges and signs of change

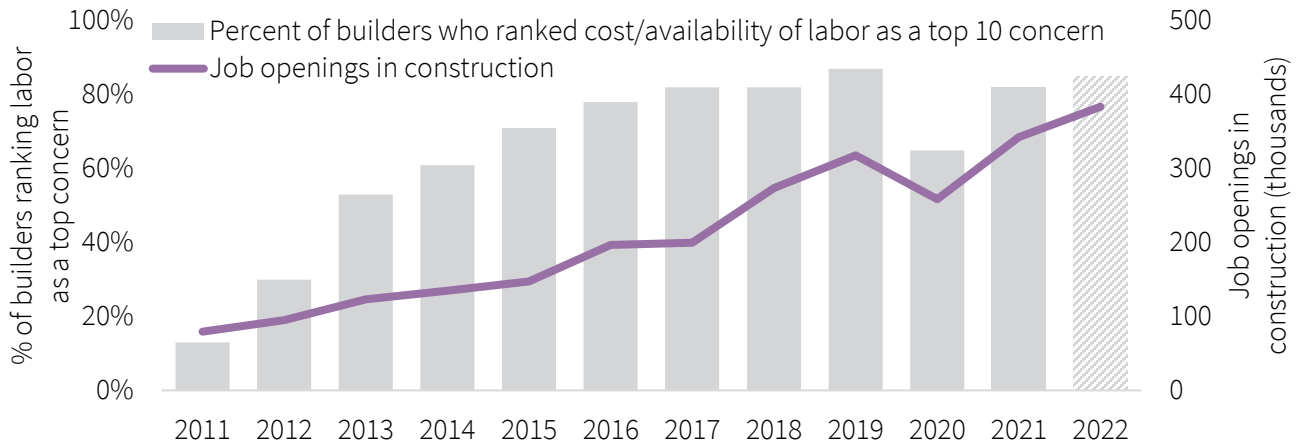
Long-term difficulties in construction employment continued over the course of 2021. While labor shortages have been widespread across all industries during the COVID-19 pandemic, the construction industry has been in an extended crisis period since the middle of the past decade. Specifically, the labor force is aging and not seeing replacement levels of new employees in younger or prime working ages. These issues are most acute in skilled sectors of the construction, with the largest losses from 2019 to 2021 recorded in electricians, carpenters, masons, and plumbers. Only general construction laborers recorded a significant net increase in employment from a pre-COVID-19 baseline but did so through a disproportionate gain in the 55-and-older age group. The specific additions suggest that most are older workers aging into a new bracket who are not retiring, potentially due to financial inability, and may have limited time left in the physically demanding role. Unfilled jobs increased to a record high of 380,000 jobs in January 2022, and labor returned as a top concern for contractors. Turnover data indicates that most quits in the construction industry are moves between firms, following the prevailing trend across industries of workers searching for better pay and opportunities.

Change in construction employment by age group 2019–2021



Sources: JLL Research, U.S. Bureau of Labor Statistics

The construction labor shortage



Sources: JLL Research, U.S. Bureau of Labor Statistics, NAHB

Employers set to hire but inflation and other vulnerabilities loom

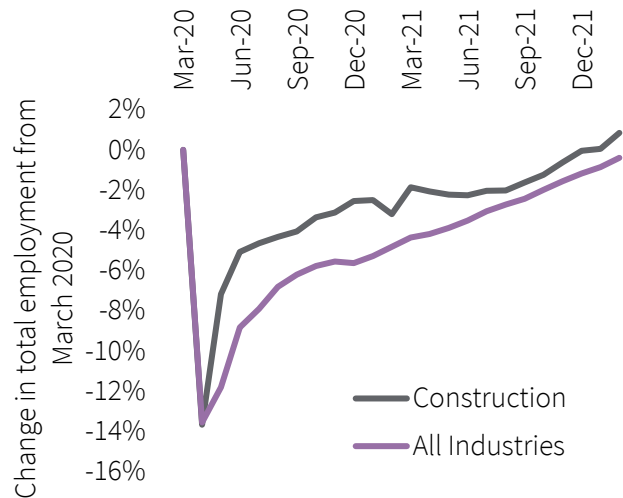
The massive COVID-19-related layoffs in March and April 2020 have receded, with most recent employment numbers putting the total construction labor force just 1 percent below its pre-pandemic size. After a quick recovery and leveling off for an extended period as construction spending lagged, hiring has hit a new level of urgency in early 2022. Market participants cite strong residential construction demand and anticipated projects in infrastructure, as well as the return of nonresidential work, as drivers in hiring. As part of the resurgence of hiring, wages increased to an unseasonably high extent in the past few months for a total year-over-year growth of 6 percent, the highest rate in 40 years. Despite the increased costs of labor, most construction firms intend to continue hiring, shoring up their workforce in anticipation of future projects.

However, record increases in wages continue to lag inflation and wage growth in other industries. The lag, as well as the inherent impossibility of offering work from home or other emergent employment perks, may continue to drive potential workers away from the construction industry or cause existing workers to reevaluate their career paths. Heightened competition is expected to be the norm going forward, with no readily available solution. Further, the current hiring spike and competition require work volume to ramp up quickly to avoid further exacerbating inflation. With minimal projects to

compete for and heightened labor costs, a lack of project volume will generate an inflationary environment.

Despite most countries moving toward treating COVID-19 as an endemic disease, the construction labor force remains exceptionally vulnerable to the virus. As stated in our previous outlook report, the construction industry has the lowest vaccination rate, and the highest vaccine hesitancy rate, of any major industry.

Employment recovery: Construction vs. all industries



Sources: JLL Research, U.S. Bureau of Labor Statistics, NAHB

Grading our previous construction forecasts

How have our forecasts from the last Construction Outlook held up?

In our previous report, the [H2 2021 JLL Construction Outlook](#), we laid out five key forecasts. Each of those five forecasts is reviewed and assessed below.

Construction labor costs | Grade: **On target**

Original forecast: “The construction labor market has mostly recovered from the pandemic and falling unemployment rates over the last six months have coincided with a steep increase in wages. Looking ahead to the next year, construction labor costs will continue to grow at a similar elevated rate to the last six months, with wage increases in the 3 to 6 percent range expected.”

Assessment: Construction wages are up 6 percent over the past 12 months, falling at the high end of our forecast range. Wage growth has been consistent over the past year but notably remains below inflation.



Political implications | Grade: **On target**

Original forecast: “As of this writing, the fate of major public spending on infrastructure still hangs in the balance of Senate negotiations. Any major spending will funnel large amounts of money toward construction, but a smaller portion will directly impact commercial work, rather than true infrastructure. If the infrastructure bill passes, much of the spending, and therefore the cost impacts, will occur in years 2 to 6 after passage rather than right away.”

Assessment: As the IIJA passed in late 2021 and the larger social spending bill remains trapped in Congress, spending is expected to begin over the next year, with impacts accruing over the next few years.



Construction volume | Grade: **Near target**

Original forecast: “Inflation-adjusted nonresidential construction spending has declined consistently since the pandemic began, driven downward by fewer new project starts in 2020. Spending is beginning to level out, but the combination of the delta variant and typically slower winter months means that any true rebound is unlikely until spring or summer 2022.”

Assessment: Nonresidential construction is down 18.5 percent on a 12-month basis. The persistent decline was anticipated, albeit at a slightly slower pace due to higher-than-expected inflation rates. Spending fell considerably in October 2021 and January 2022, accelerating the overall decline and falling after prior-month gains in both cases. The forecast for growth to resume in the spring and summer months remains uncertain, with some indications of increased activity as of the time of writing as well as significant challenges on the horizon.



Total construction costs | Grade: **Off target**

Original forecast: “The year ahead will look much like the year so far, as moving forward we will grapple with similar supply chain challenges, potential new waves of coronavirus infections globally and labor shortages at home. The net effect will be another above-average year of total construction cost growth, forecast to increase 4 to 7 percent over the next 12 months.”

Assessment: Between the fourth quarter of 2020 and the fourth quarter of 2021, average commercial construction costs in the U.S. have increased significantly. An unprecedented range of cost increases were reported, from 5 to 21 percent year-over-year and an average of roughly 12 percent. This generally exceeds our forecast by a considerable measure, with our conservative estimate on materials price increases largely accountable for the discrepancy.



Construction materials costs | Grade: **Off target**

Original forecast: “Material costs are the lowest-confidence forecast due to the wide range of inputs and global supply chains bucketed into a single category. The net impact will be a wide range of price changes for individual materials, with an average increase across all materials in the 5 to 11 percent range expected.”

Assessment: Resurgent lumber prices and further supply chain complications have pushed materials costs well above our forecasted numbers, almost doubling the anticipated increase. At a 21 percent increase between February 2021 and February 2022, it is the largest ever recorded increase in materials prices. Concerningly, many factors contributing to the destabilized prices remain unresolved and new issues are emerging.





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AGC
THE CONSTRUCTION
ASSOCIATION

FEB

2022

CONSTRUCTION INFLATION ALERT

Two years after the coronavirus pandemic struck, the U.S. construction industry is still experiencing multiple impacts. Unprecedented increases in materials costs, supply-chain disruptions, and an increasingly tight labor market have made life difficult for contractors and project owners alike.

Beginning in March 2021, the Associated General Contractors of America (AGC) has posted several editions of the *Construction Inflation Alert*, a document to inform project owners, government officials, and the public about these impacts on construction. The current version is the fifth update of that Alert—an indication that the situation is far from “normal.”

Although the overall economy posted exceptionally strong growth in 2021 and appears to be headed for further expansion, the construction industry has experienced a much more uneven recovery. Until recently, lagging demand for numerous types of nonresidential construction prevented many contractors from fully passing on their added costs. Successive outbreaks of Covid-19 have disrupted production and delivery of goods, labor availability, and the mix of projects. This combination of supply chain bottlenecks, unpredictable costs and delivery times, and smaller bid price increases threatens to push some firms out of business.

This report is intended to provide all parties with better understanding of the current situation, the impact on construction firms and projects, its likely course in the next several months, and possible steps to mitigate the damage. The document will be revised to keep it timely as conditions change; download it at [AGC Construction Inflation Alert | Associated General Contractors of America](#).

Please send comments and feedback to AGC of America’s chief economist, Ken Simonson, ken.simonson@agc.org.

www.agc.org

Record cost increases

Contractors experienced record increases for materials costs in 2021. While some costs have subsided in recent months, others have continued to rise or have become volatile in both directions—a threat in its own way.

Around the middle of each month, the Bureau of Labor Statistics (BLS) posts producer price indexes (PPI) for thousands of products and services at www.bls.gov/ppi. Most of these are based on the prices that sellers say they charged for a specific item on the 11th day of the preceding month. Producers include manufacturers and fabricators, intermediaries such as steel service centers and distributors, and providers of services ranging from design to trucking.

BLS aggregates these prices into index numbers that cover an entire category of products, such as a weighted average of all concrete products, as well as indexes for the mix of goods and services purchased by industries such as construction. The index readings themselves do not translate into a price found in the market, but the percentage change in an index number from one period to another indicates the amount of price increase or decrease that has occurred.

The PPI for inputs to new nonresidential construction is a weighted average of the goods and services purchased for every type of new construction other than housing. It does not include a contractor's own labor costs, equipment purchases, or direct imports but does cover an importer's or distributor's markup on imported goods.

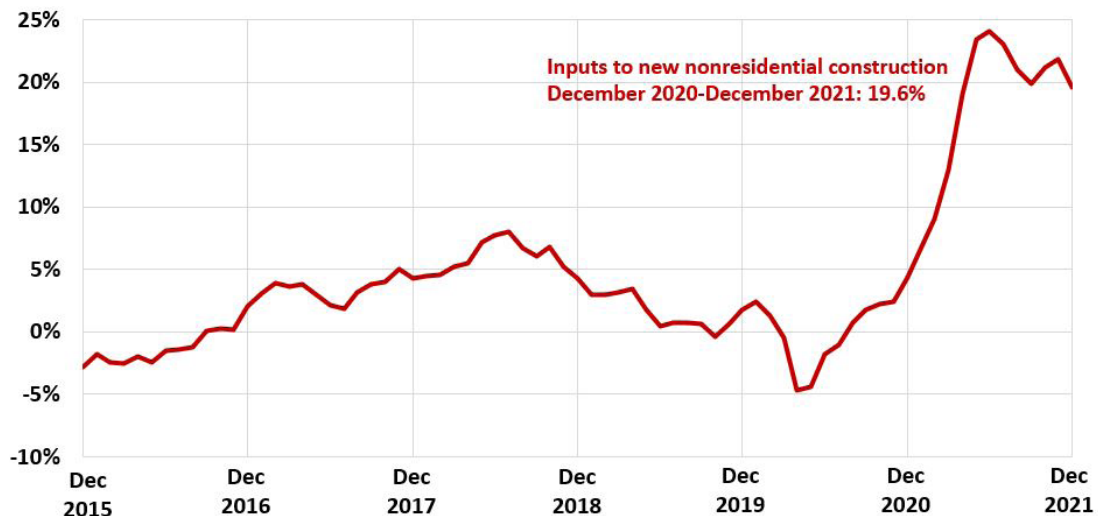
This index rose by a record amount in 2021. As shown in Figure 1, the index soared 24.1% from June 2020 to June 2021 before moderating slightly. From December 2020 to December 2021, the increase still totaled 19.6%—a huge jump from the 4.4% rise posted in 2020 and the 1.8% gain in 2019.

24.1%
The producer price index soared 24.1% from June 2020 to June 2021. By December, the increases had moderated slightly but still totaled 19.6% for the year.

Figure 1

Change in prices for inputs to construction

Year-over-year change in PPI, 2015 - 2021, not seasonally adjusted



Source: Bureau of Labor Statistics, producer price indexes, www.bls.gov/ppi

No category of construction has escaped the extreme cost escalation. BLS posts PPIs for inputs to highways and streets; commercial, healthcare, industrial, power and communications, education and vocational, and other miscellaneous nonresidential structures; and for single- and multifamily construction. From December 2020 to December 2021, the increases in these input cost indexes ranged from 14.6% for new multifamily construction to 20.7% for commercial structures.

Contributors to runaway costs

What has contributed to these extreme cost increases? In brief: nearly everything, as shown in Table 1. From December 2020 to December 2021, the PPI for steel mill products more than doubled, rocketing up 127.2%. There were double-digit increases in the PPIs for plastic construction products, 34.0%; aluminum mill shapes, 29.8%; copper and brass mill shapes, 23.4%; gypsum products, 20.7%; lumber and plywood, 17.6%; architectural coatings (paint), 13.9%; and asphalt felts and coatings, 11.8%.

Even items that did not end the year with double-digit gains had unusually large increases. The PPI for concrete products jumped 8.5% from December 2020 to December 2021, the largest rise in 15 years. The index for flat glass also posted an 8.5% gain (from November 2020 to November 2021), a 40-year high, before finishing the year with an increase of 7.3%.

In addition to materials that go into structures, prices for items and services used by contractors soared. For instance, contractors pay for huge amounts of diesel fuel—purchased directly to run contractors’ own trucks and offroad equipment, as well as indirectly in the freight charges or explicit fuel surcharges for myriad deliveries of goods and equipment, and the hauling away of dirt, debris, and equipment. The PPI for diesel fuel leaped 54.9% from December 2020 to December 2021, while the index for truck transportation of freight climbed 17.7%.

Contractors also paid much more for equipment and parts. The PPI for construction machinery and equipment jumped 10.1% in 2021, and the index for truck and bus (including off-the-highway) pneumatic tires rose 11.2%.

As shown in Table 1, all of these increases far exceeded the changes a year earlier.

\$3.95

The retail price of diesel fuel reached a nearly 8-year high of \$3.95 per gallon on February 7, an increase of \$1.15 or 41% from one year earlier.

Table 1

Price increases for construction inputs
Year-over-year change in December PPI

Construction materials	2020	2021
Steel mill products	5.2%	127%
Plastic construction products	5.4%	34%
Aluminum mill shapes	-1.7%	30%
Copper and brass mill shapes	24%	23%
Gypsum products	3.6%	21%
Lumber and plywood	37%	18%
Architectural coatings	1.9%	14%
Asphalt felts and coatings	2.1%	12%
Used by contractors		
Diesel fuel	-2.8%	55%
Truck transport of freight	2.2%	18%
Construction machinery and equipment	1.1%	10%
Truck and offroad tires	0.3%	11%

Source: Bureau of Labor Statistics, producer price indexes, www.bls.gov/ppi

What happened to bid prices?

The extreme runup in so many input costs caused financial hardship for many contractors and subcontractors, especially for those whose purchases are concentrated in materials with extra-steep increases. Eighty-four percent of the contractors in the 2022 AGC/Sage Construction Hiring and Business Outlook Survey reported their firms had incurred unanticipated costs in 2021.

BLS posts several PPIs for new nonresidential construction and for subcontractors' pricing. Since every construction project is unique, it is not possible to collect prices for identical construction "products" in the same way as for most goods and services. Instead, the agency creates "bid price" PPIs (BLS refers to them as output price indexes) through a two-step process. Each quarter it receives data from construction cost-estimating firms as to the cost of a package of installed components or "assemblies" of a particular nonresidential building. Every month BLS asks a fixed group of contractors the amount of overhead and profit they would charge to erect that building. BLS combines the answers from a set of contractors to create PPIs for new warehouse, school, office, industrial, and healthcare building construction, along with a weighted average of these building types for an overall index for new nonresidential building construction. There are also indexes for maintenance and repair and for all types of nonresidential work performed by concrete, electrical, roofing, and plumbing contractors.

Figure 2

Change in prices for new nonresidential construction inputs vs. bid prices

Year-over-year change in PPIs, Sep 2020 – Dec 2021, not seasonally adjusted

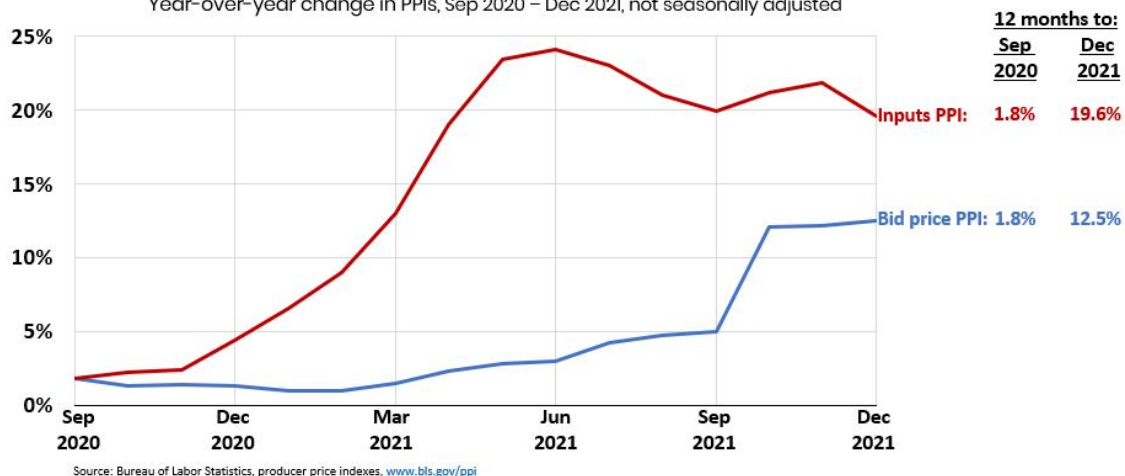


Figure 2 shows how the gap between input costs and bid prices widened dramatically beginning in September 2020. In that month, both price indexes increased 1.8% from the year-earlier level. Then, through mid-2021, the year-over-year increase in input costs outran the rise in bid prices by larger amounts each month. As noted above, input prices moderated in the second half of 2021, while bid prices rose more than in past years. But the 12.5% annual increase through December in the bid price PPI was far short of the 19.6% input-price increase. As a result, contractors were absorbing more and more of the cost increases.

Moreover, the bid-price index only indicates the price contractors propose for new starts. On projects for which they had already submitted a bid or begun work, contractors were stuck with paying elevated materials prices that they could not pass on.

Tariffs have also driven up some prices. In November, the Commerce Department doubled the tariff on Canadian softwood lumber from 9% to 18%. The 25% tariff on steel and 10% tariff on aluminum imposed by President Trump have largely been left in place so far by President Biden. In addition, President Trump imposed tariffs on thousands of products from China but created an exclusion process that enabled some items not produced in the U.S. to be imported without the tariff. The Biden administration largely suspended the exclusions, adding to the number of items with tariff-induced price increases.

Volatility vs. continuous cost increases

Despite the steep increase in most input prices last year, several of them slowed or reversed course during 2021. Price indexes for diesel fuel and lumber each more than doubled from mid-2020 to mid-2021 before ending the year higher by “only” 55% and 18%, respectively. The PPI for copper and brass mill shapes had a year-over-year gain of 65% earlier in 2021 but wound up “only” 23% higher than in December 2020.

Prices for each of these items have recently turned higher again. The futures price for lumber, as traded on the CME commodities exchange, tripled from a low in October to early January before partially retreating later in the month. The futures price for copper moved higher in January. The retail price of diesel fuel, as reported each Monday by the Energy Information Administration, reached a nearly eight-year high of \$3.95 per gallon on February 7, an increase of \$1.15 per gallon or 41% from one year earlier. These changes are likely to show up in PPIs in early 2022, and the fuel price increase will likely spread to higher prices for trucking, especially for deliveries of heavy items such as ready-mix concrete and rebar.

As of early February, it does not appear likely that input prices will set new records in 2022. But wide swings in both directions may continue. Such volatility can be as risky to contractors’ solvency as a steady change. Firms may submit bids based on the assumption that current prices will hold or slip further, only to be caught by a new upswing. And owners may pressure contractors to pass along recent price declines, not recognizing that current prices may not reflect the price a contractor already committed to pay for materials or the price it will pay months later when it places an order. There have also been recent cases of suppliers refusing to quote firm prices until time of shipment, at which point prices may greatly exceed the current price.

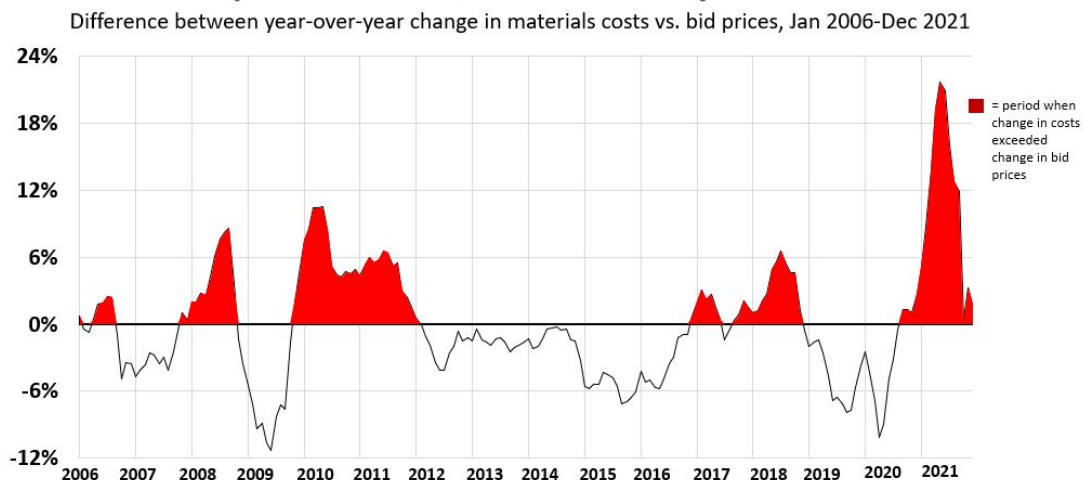
When will bid prices catch up?

There is no fixed relationship between input costs and bid prices. For every firm and time period, the relationship depends on specific market conditions and expectations.

However, it is possible to look at past relationships. Figure 3 shows the difference between the year-over-year change in the PPI for materials costs for goods inputs to construction and the bid price index for new warehouses (the longest time series available).

Figure 3

Cost squeeze on contractors can last two years or more



Source: Source: Bureau of Labor Statistics, www.bls.gov/ppi, producer price indexes for goods inputs to construction (material costs) and new warehouse construction (bid prices)

The areas in red indicate periods in which the year-over-year change in the PPI for inputs to construction exceeded the PPI for new nonresidential building construction—specifically, warehouses. (Similar patterns exist for the other new-construction “bid price” indexes: the PPIs for new school, office, industrial and healthcare buildings.)

Materials costs outrun bid prices for as long as 27 months from late 2009 to early 2012 and for nearly 24 months from late 2016 to late 2018. The current gap hasn’t lasted as long—yet—but the peak was twice as high as in previous episodes, indicating the pain for contractors was that much more intense.

Supply-chain issues

From the first days of the pandemic, availability and delivery times for materials have been never-ending headaches for construction firms. Problems began as early as February 2020, when factories in China and northern Italy were shut down, causing shortages of items as diverse as elevator parts, floor tiles, and kitchen appliances.

The following month, as the U.S. economy went into a steep dive, construction firms canceled orders and suppliers lost workers to Covid-19 or shut to comply with governors’ edicts. When orders rebounded, there were not enough workers, ships, port berths, containers, chassis, or trucking, rail, and warehouse workers to produce and move goods.

Adding to these pandemic-induced problems, a series of unusual mishaps interfered with output or delivery of numerous goods. The biggest impact for construction came from the deep freeze in Texas in February 2021 that damaged all of the petrochemical plants producing resins for a host of construction plastics. Damage to the electrical grid in Louisiana from Hurricane Ida last summer further interfered with the production of some plastics inputs. Wildfires and mudslides in British Columbia and soggy conditions in the Southeast have affected lumber production. The blockage of the Suez Canal and the abrupt closure of an Interstate highway bridge across the Mississippi River in 2021 are further examples of “one-off” events that have disrupted the supply chain.

Construction has also been affected by the much-publicized shortage of computer chips. Not only is the industry a major buyer of pickup trucks that are in short supply, but deliveries of construction equipment also have been held up by a lack of semiconductors.

With so many factors contributing to delays, it is not surprising that 72% of the respondents to AGC’s outlook survey reported that projects took longer than anticipated last year. As a result, 44% report that their firms are putting longer completion times into bids or contracts.

So far, there is little sign that the supply chain will consistently improve in 2022. While the lead time for some items has shortened, deliveries for many materials remain delayed or unpredictable. Dealers and contractors continue to report being informed shortly before an expected delivery that the item will not arrive for months or the quantity will be less than expected—and needed. Other items have shown up unexpectedly early, without warning, causing problems when they cannot be used, installed, or stored onsite.

273,000
Construction job openings at the end of 2021 totaled 273,000, a jump of nearly 30% from the end of 2020.

Worker availability

The construction industry lost 1.1 million employees from February to April 2020—a 15% decline in just two months and nearly half as many as in the industry’s five-year downturn from 2006 to 2011. While both residential and nonresidential construction employment rebounded somewhat in May 2020, employment stalled for more than a year after that among nonresidential firms—general and specialty trade contractors plus civil and heavy engineering construction firms. During that period, thousands of experienced workers moved into residential construction (homebuilding and remodeling), found jobs in other sectors, or left the workforce completely.

Nonresidential employment grew strongly in the last four months of 2021. But job openings increased even faster. Openings at the end of 2021 totaled 273,000, a jump of nearly 30% from the end of 2020, according to BLS’s Job Openings and Labor Turnover Survey. The total exceeded the 220,000 employees hired in December, implying that construction firms would have added twice as many workers as they were able to, if there had been enough qualified applicants.

In order to attract, retain, and bring back workers, construction firms are raising pay. Average hourly earnings in construction rose 5.8% from February 2021 to January 2022 for “production and nonsupervisory employees”—mainly hourly craft workers. But the average for such workers in the overall private sector climbed 6.9%. The implication is that construction companies will have to raise pay even more in the coming months to remain competitive.

What can contractors and owners do?

While contractors cannot unplug ports or rescind tariffs, they can provide project owners with timely and credible third-party information about changes in relevant material costs and supply-chain snarls that may impact the cost and completion time for a project that is underway or for which a bid has already been submitted.

Owners can authorize appropriate adjustments to design, completion date, and payments to accommodate or work around these impediments. Nobody welcomes a higher bill, but the alternative of having a contractor go out of business because of impossible costs or timing is likely to be worse for many owners.

For projects that have not been awarded or started, owners should start with realistic expectations about current costs and the likelihood of increases. They should provide potential bidders with accurate and complete design information to enable bidders to prepare bids that minimize the likelihood of unpleasant surprises for either party.

Owners and bidders may want to consider price-adjustment clauses that would protect both parties from unanticipated swings in materials prices. Such contract terms can enable the contractor to build in a smaller contingency to its bid, while providing the owner an opportunity to share in any savings from downward price movements (which are likely at some point, particularly for long-duration projects). The ConsensusDocs set of contract documents (www.consensusdocs.org) is one source of industry-standard model language for such terms. The ConsensusDocs website includes a price escalation resource center (<https://www.consensusdocs.org/price-escalation-clause/>).

The parties may also want to discuss the best timing for ordering materials and components. Buying items earlier than usual can provide protection against cost increases. But purchase before use entails paying sooner for the items; potentially paying for storage, security against theft and damage; and the possibility of design changes that make early purchase unwise.

Conclusion

The construction industry is in the midst of a period of exceptionally steep and fast-rising costs for a variety of materials, compounded by major supply-chain disruptions and a shortage of available workers—a combination that threatens the financial health of many contractors. No single solution will resolve the situation, but there are steps that government officials, owners, and contractors can take to lessen the pain.

Federal trade policy officials can act immediately to end tariffs and quotas on imported products and materials. With many U.S. mills and factories already at capacity, bringing in more imports at competitive prices will cool the overheated price spiral and enable many users of products that are in short supply to avoid layoffs and shutdowns.

Officials at all levels of government should review all regulations, policies, and enforcement actions that may be unnecessarily driving up costs and slowing importation, domestic production, transport, and delivery of raw materials, components, and finished goods.

Owners need to recognize that significant adjustments are probably appropriate regarding the price or delivery date of projects that were awarded or commenced early in the pandemic or before, when conditions at suppliers were far different. For new and planned projects, owners should expect quite different pricing and may want to consider building in more flexibility regarding design, timing, or cost-sharing.

Contractors need, more than ever, to closely monitor costs and delivery schedules for materials and to communicate information with owners, both before submitting bids and throughout the construction process.

Materials prices do eventually reverse course. Owners and contractors alike will benefit when that happens. Until then, cooperation and communication can help reduce the damage.

AGC resources

This document will be updated if market conditions warrant. Check <https://www.agc.org/learn/construction-data/agc-construction-inflation-alert> for the latest edition.

The AGC website, www.agc.org, has a variety of resources available to contractors, owners, and others wanting to know more about the construction industry.

AGC posts tables showing changes in PPIs and national, state, and metro construction employment each month at <https://www.agc.org/learn/construction-data>

AGC's Data DIGest is a weekly one-page summary of economic news relevant to construction. Subscribe at https://store.agc.org/Store/Store/StoreLayouts/Item_Detail.aspx?iProductCode=4401 or email chief economist Ken Simonson at ken.simonson@agc.org.

Construction documents are available for viewing and purchase from ConsensusDocs at www.consensusdocs.org, including the price escalation resource center, www.consensusdocs.org/price-escalation-clause/